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School of Pharmacy

HCIC 2025

HEALTHCARE CHALLENGES AND INNOVATIONS in 21ST CENTURY!

January 28-29, 2025

C-II, Johar Town, Lahore

Abstract Book

1st International Conference on Healthcare Challenges and Innovations in 21st Century
HCIC 2025

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ACKNOWLEDGEMENTS

A special thanks to our collaborators, sponsors and partners

In the loving memory of a visionary leader

Prof. Dr. Hasan Sohaib Murad (shaheed)

Professor Dr. Hasan Sohaib Murad (shaheed) was a renowned scholar of organization and management. He was entrepreneur, educationist, writer, researcher, influencer, policymaker and a social reformer. He was the founding rector of the University of Management and Technology, Lahore, Pakistan.

"Degrees are temporal and degrees are for transition, Diamonds are forever and diamonds are meant to be transcendental. Diamond is the purest and the hardest thing on the surface. It cannot be compromised and it cannot be contaminated. So, transform yourself like a diamond to become everyone's desire to have you around"

Dr. Hasan was a man of vision, Innovation, communication and inspiration. Dr. Murad's efforts for cultivating and promoting business education in Pakistan have been widely appreciated by the business organizations, industry and Government of Pakistan as well.

We pray for his maghfirat and higher ranks in Jannah. May his legacy continues to inspire us all.

Message

Ibrahim Hasan Murad

President ILM Trust,

President UMT

University of Management and Technology, Lahore

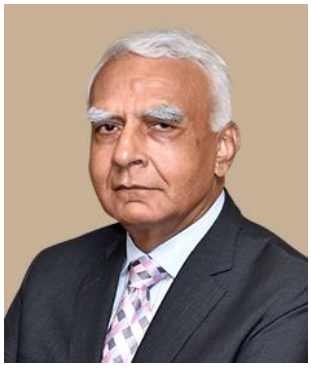
It is with immense pride that I welcome you to the International Conference on Healthcare Challenges and Innovations in the 21st Century, organized by the School of Pharmacy at UMT. This landmark event provides a dynamic platform for academia, industry, and healthcare professionals to come together and address some of the most pressing challenges in healthcare while exploring innovative solutions that will shape the future of the field.

The themes of this conference: ranging from revolutionary advancements in drug discovery to the ethical integration of AI, genomics, and personalized medicines are not only timely but also critical to redefining healthcare in a rapidly changing world. These discussions and collaborations are pivotal in fostering groundbreaking ideas, driving interprofessional education, and enhancing practices that benefit humanity.

UMT is honored to host this gathering of brilliant minds from diverse disciplines and regions, united by a shared vision of improving healthcare. I am confident that the knowledge exchanged and connections forged here will pave the way for transformative innovations and global impact.

I extend my heartfelt gratitude to the Conference Chair, organizing committee, distinguished speakers, and participants for their dedication and contributions to making this conference a resounding success. Together we can inspire progress and shape the future of healthcare.

Wishing you an intellectually enriching and rewarding experience at UMT.



Message

Dr. Asif Raza

Rector

University of Management and Technology, Lahore

Dear Participants

I am pleased to welcome you all to the International Conference on Healthcare Challenges and Innovations in the 21st Century, hosted by UMT. This event, organized by UMT School of Pharmacy marks a significant milestone in our commitment to transform innovative ideas into tangible solutions. This gathering would serve as an opportunity for health care professionals, researchers and thought experts from diverse fields to express ideas and share expertise to overcome the complex challenges of modern healthcare.

The themes of this conference; revolutionizing drug discovery, advancing interprofessional education, personalized medicine through genomics, innovative solutions for a changing health care landscape and ethical integration of AI signify the pivotal advancements influencing the future of healthcare. These topics not only highlight the tremendous potential for innovation but also emphasize on the utilization of modern technologies meticulously.

Healthcare today demands interdisciplinary collaboration and innovation. At UMT, we are dedicated to building knowledge, driving innovation, and fostering partnerships that can make healthcare more inclusive, efficient, and impartial. I am confident that the discussions and insights shared on this platform will inspire groundbreaking solutions and transformative progress in the healthcare sector.

I want to express my sincere appreciation to the organizing team, esteemed speakers, and participants for their invaluable contributions in bringing together the healthcare community to explore new possibilities and innovations and to promote a healthier and better future for all.

Message

Prof. Dr. Asghar Zaidi

Provost

University of Management and Technology, Lahore

On behalf of the University of Management and Technology (UMT), I am delighted to extend a warm welcome to all participants of the inaugural International Conference on "Healthcare Challenges and Innovations in the 21st Century," organized by our esteemed School of Pharmacy, under the leadership of Prof. Dr. Ejaz Ullah Cheema. This landmark event reflects UMT's unwavering commitment to advancing healthcare innovation, particularly in the context of Pakistan's unique challenges and opportunities.

At UMT, we are shaping the future of education by pioneering innovations by integrating Artificial Intelligence into our courses and programs. Through these efforts, we aim to empower students with cutting-edge skills and enhance capacity building in research methodologies across disciplines. UMT's distinction as the top-ranked interdisciplinary research private sector university in Pakistan underscores our dedication to pushing boundaries and driving impactful solutions for critical issues, including healthcare.

Healthcare innovation holds transformative potential for Pakistan, a country striving to address the evolving needs of its population in an era of rapid technological and scientific progress. By fostering collaboration among top-level experts, this conference will serve as a beacon for innovative ideas, ethical practices, and sustainable advancements in healthcare systems.
I invite all participants to actively engage in the sessions, share insights and contribute to a collective vision for a healthier and more innovative future for Pakistan. Together, let's harness the power of innovation to improve lives and communities.

Warm Regards.

Message

Prof. Abid Hussain Khan Shirwani

Chief Advisor on Innovation and Director ORIC/TISC

University of Management and Technology, Lahore

Healthcare Challenges and Innovations in 21st Century (HCIC 2025) Message from Prof. Abid Hussain Khan Shirwani Co-Founder, Chief Advisor on Innovation and Director ORIC/TISC Healthcare in the 21st century stands at a transformative crossroads, where unprecedented innovations offer hope for breakthroughs while complex challenges demand urgent attention. The themes of this conference—innovative solutions for a changing healthcare landscape, advancing inter-professional education, revolutionizing drug discovery, ethical integration of AI, and personalized medicine through genomics—reflect the core areas where innovation can create profound impact. Today, we face a world grappling with rising healthcare demands, inequities, and ethical dilemmas posed by rapid technological advancements.

These challenges compel us to think creatively and work collaboratively across disciplines. Innovation in healthcare is no longer optional; it is a necessity. From leveraging the artificial intelligence to enhance diagnostics and decision-making to employing genomics for personalized treatments, the possibilities are endless. However, these advancements also come with ethical and implementation challenges, requiring us to balance progress with integrity and inclusivity. Let us remember that innovation is not just about technology but about reshaping systems, policies, and mindsets to create equitable and sustainable healthcare solutions. The future of healthcare lies in our ability to transform these challenges into opportunities for growth, ensuring that progress benefits humanity as a whole. I congratulate to the organizers, the School of Pharmacy and his team for organizing this visionary conference that inspires collaboration and innovation in shaping the future of healthcare.

Message

Prof. Dr. Ejaz Cheema

Founding Dean- School of Pharmacy, UMT

On behalf of UMT School of Pharmacy, I am pleased to welcome you to the first International Conference **"Healthcare Challenges and Innovations in the 21st Century"** organized by UMT School of Pharmacy**.** In a world where the healthcare landscape is evolving rapidly, the role of pharmacists in the health care systems has also evolved significantly over the last two decades that requires them to play a key role as part of multidisciplinary healthcare teams in the delivery of an innovative, safe and quality healthcare to patients and public at large. This evolution in the role of pharmacists requires them to not only possess core and up-to-date scientific and clinical knowledge but also requires them to demonstrate strong ethical values, professional behavior with excellent communication, research, leadership and entrepreneurship skills. Furthermore, pharmacists along with other healthcare professionals are expected to update their scientific and clinical knowledge on continuous basis, often known as continuous professional development (CPD) to help them prepare for the challenges of the 21st century.

Keeping in view the evolving healthcare landscape coupled with the competencies required by healthcare professionals, the need to address critical challenges while embracing technological advancements has never been more crucial. This conference, therefore, provides an opportunity for healthcare experts, practitioners, industry leaders and other stakeholders from across the globe to come together and share their insights into the future of healthcare. It aims to foster dialogue and collaboration among key stakeholders, highlight groundbreaking innovations and the latest trends in pharmaceutical sciences as well as promote interdisciplinary collaboration to address complex healthcare issues effectively.

I want to sincerely express my heartfelt gratitude to our organizing team, sponsors and partners who have worked tirelessly to organize this conference. Let us therefore, seize this opportunity to inspire one another and pave the way for a healthier and more innovative future.

Once again, welcome to this first International Conference on Healthcare Challenges and Innovations and I wish you all a very productive, informative and enjoyable experience.

CONFERENCE COMMITTEES

1st International Conference on Healthcare Challenges and Innovations in 21st Century
HCIC 2025

Sr.No.	Committee	Conveners	Faculty
1.	Organizing Committee	Prof. Dr. Ejaz Cheema	Dr. Rabia Altaf Dr. Waqar Aman Dr. Abdul Qayyum Dr. Sarah Rehman Dr. Sobia Razzaq Ms. Asra Shanzeh Ms. Raeesa Ahmed
2.	Speakers Coordination Committee	Dr. Rabia Altaf	Dr. Amber Sharif Ms. Noor Waleed Mr. M. Muaaz
3.	Media & Entertainment	Ms. Asra Shanzeh	Ms. Tangina Malik Ms. Raeesa Ahmed
4.	Registration Committee	Dr. Abdul Qayyum	Ms. Sonia Gondal Ms. Saba Ashraf Mr. Hafiz Hanzalah
5.	Event Schedule, management and Refreshment Committee	Dr. Sarah Rehman	Ms. Asma Fehar Mr. M. Muaaz Dr. Uzma Nisar Ms. Raeesa Ahmed
6.	Sponsor Coordination Committee	Dr. Sobia Razzaq	Ms. Asra Shanzeh Mr. Hafiz Hanzalah Ms. Kanwal Mazhar
7.	Scientific & Poster Coordination Committee	Dr. Waqar Aman	Dr. Sarah Rehman Dr. Iram Shahzadi Ms. Ramna Zia
8.	Budget Management Committee	Dr. Abdul Qayyum	Ms. Noor Waleed Ms. Raeesa Ahmed

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Keynote Speakers

Prof. Dr. Sohail Asif Qureshi

Director of Research and Innovation- Shalamar Institute of Health Sciences

Title: "Recent Advances in Drug Discovery and Development"

Dr. Sohail Qureshi is a molecular biologist with over 30 years of post-PhD experience as researcher and science educator. After postdoctoral training at Glasgow University, Imperial Cancer Research Fund (UK) and Cambridge University, he joined University of Wisconsin-Madison as Assistant Professor, and Invitrogen Corporation as Senior Scientist, before returning to Pakistan in 2004. Until 2011, Dr. Qureshi was at The Aga Khan University Hospital and thereafter served the Syed Babar Ali School of Science & Engineering at Lahore University of Management Sciences (LUMS) as Professor and Dean. In 2016, he joined CECOS University as Professor and director in the Institute of Integrative Biosciences (IIB). Dr. Qureshi was appointed as Vice Chancellor of CECOS University in 2019. Since January 2022, is serving as Professor in Shalamar Institute of Health Sciences, the Department of Life Sciences, University of Management & Technology (UMT) as Professor. His research interests include gene regulation in extremophiles, epigenetics of cancer, and biology of hepatitis-C virus.

Mr. Sajjad Hafeez

Chief Operating Officer- Highnoon

Sajjad Hafeez is Operations Management Expert and leading Technical Operations Function in **Highnoon** for the last 6 Years. He is an MBA from Pioneers Institute of Research and Advance Sciences. He has a work experience of 32 years including government and private sector. The major companies include, Himont Chemicals, Servaid Retail Pharmacy Chain, OBS (Merck, Sharp & Dhome, Schering Plough, Organon), The Searle Company and Highnoon Laboratories. He is Founder of High-Talk and TED Talk like forum, Learning & Development Centre.

Professor Zohra Khanum

Prof. Dr. Zohra Khanum
Obstetrician & Gynecologist
Health Profession Educationist
Gynaecological Endoscopic Surgery
Title: "Women Healthcare at all ages"

Professor Zohra Khanum is an esteemed Obstetrician and Gynecologist, a Health Professions Educationist, and a Gynecological Endoscopic Surgeon holding an array of qualifications, including an MBBS, FCPS (OBGY), MCPS (OBGY), FACS (USA), FCPS (Bangladesh), MCPS (HPE), and DCPS (HPE), a Diploma in Advanced Gynecological Endoscopic Surgery from France and is recognized as a Gynecological Endoscopist by the European Academy. Professor Khanum specializes in pre-pregnancy and pregnancy care, an expert in gynecological endoscopic surgery, including laparoscopy, hysteroscopy, and related advanced procedures.

Dr Rizwan Mahmood (PhD) UK.
M.Pharmacy (PU), PhD (U.K)
Title: Innovations in Pharmaceutical Products and Challenges.

A pharmaceutical professional with expertise in Product Development, Quality Operations and QMS, GMP Trainings (Industry, WHO, USP). He is a co-supervisor of few M. Phil and PhD Research Projects. He is a member of BOS and Advisory Board of UMT. He was Ex Director (Chief Quality Officer) CCL Pharmaceuticals. He is quality head at Glaxo Smith kline Pakistan Ltd., Executive Director Quality, Highnoon Laboratories, and Production Officer, Rhone Poulenc Rorer.

Dr. Tahir Mehmood Khan
Associate Professor / Director IPS, UVAS
B.Pharm (UOP, Pakistan), MS Clinical Pharmacy (USM, Malaysia), PhD (USM, Malaysia)
Post Doctorial, Graduate Certificate in Higher Education (Monash, Australia)
Title: Future of Pharma in Pakistan-Challenges and Opportunities

Dr. Tahir Mehmood Khan is the Director of the Institute of Pharmaceutical

Sciences (IPS) at the University of Veterinary and Animal Sciences (UVAS) in Lahore, Pakistan. He holds a PhD in Clinical Pharmacy from the University Sains Malaysia and has over seventeen years of experience in research, development, quality control, teaching, and research. Dr. Khan has published numerous research papers in internationally recognized journals and has authored several book chapters. He has also received several awards for his research and teaching excellence

Dr. Zaheer Ahmad
Project Director
Directorate of Digital Learning and Skills Enhancement
Title: Smart Research with AI: Advancing Academic Writing While Upholding Integrity

Dr. Zaheer Ahmad is currently working as Project Director in the Directorate of Digital Learning and Skills Enhancement, The University of Lahore (UoL), Pakistan. He is an experienced academic with an interest in AI and academic integrity, information management and research design and methods. He is serving at various platforms icluding secretary of SIG, Social Informatics, (Association of Information Science and Technology (ASIS&T), the editor of the Journal of Excellence in Social Sciences, an editorial member of various journals like IJIMS, JEMS etc.

Muhammad Rehan Gul
Radiopharmacy head and QAR safety coordinator at nuclear medicine department SKMCH and RC Lahore
Title: Advancements in nuclear medicine practices

Rehan is the Radiopharmacy Head and QAR Safety Coordinator at the Nuclear Medicine Department SKMCH and RC Lahore and a renowned scientist in the field of nuclear medicine, holding a US patent. With his expertise in nanomedicine, nuclear medicine, radiopharmaceuticals, and theranostics, along with being a certified healthcare quality professional, Rehan brings a wealth of knowledge and experience. His guidance will be invaluable as we work on various project

Dr. Salim Razi
Canakkale Onsekiz Mart University (COMU), Türkiye
Title: on " AI Pharmacy Education and Practice in Pakistan: Are We Ready to Tackle AI?"

Dr. Salim Razı is a professor at the English Language Teaching Programme of Canakkale Onsekiz Mart University (COMU), Türkiye. He is the Founder Director of COMU Centre for Academic Integrity. He served as a founder Board member of the European Network for Academic Integrity from 2017 to 2023 and is the co-founder of AMEA Integrity. He is the coordinator of the ongoing EU Erasmus+ KA2 project "Facing Academic Integrity Threats (FAITH)". He developed the 'transparent academic writing rubric' and struggles to prevent plagiarism through the 'anonymous multi-mediated writing model', for which he was awarded the Turnitin Global Innovation Award in 2015. He received the ENAI Outstanding Member Award in 2023 by initiating "ENAI PhD Summer Schools" that was also disseminated by Times Higher Education.

Professor Susannah Hart Co-Founder of the Medical Education Guild
Professor of Health Care and Chair of the Scientific Advisory Board, University of Cambridge
Title "Meducism: Redefining Medical Excellence Through Philosophy, Practice, and Lifelong Commitment"

A Professorial dissertation supervisor and tutor affiliated with the University of Liverpool, Hull, and Essex, with over 30 years of experience spanning health sciences practice, research, and higher education in prestigious Russell and Ivy League institutions. Holds a Doctorate degree in Education alongside certifications in higher, medical, nursing, and midwifery education. Her expertise encompasses medical education, interprofessional collaboration, curriculum design, accreditation, quality assurance, and research management, with extensive experience in both quantitative and qualitative methodologies. Dr Susannah has completed courses in AI for Healthcare Practitioners at Imperial College London, Healthcare Counseling at Yale University, and advanced studies through Stonebridge UK.

CONFERENCE SCHEDULE

1st International Conference on

Healthcare Challenges and Innovations in 21st Century

HCIC 2025

January 28-29, 2025

Inaugural Session

Day 1: 28th January 2025

Venue: Hakeem Saeed Hall, University of Management and Technology, Lahore, Pakistan

Host Ms. Asra Shanzeh (SPH)

10:00 – 10:15 a.m.	Introduction Recitation of Holy Quran (Mr. Hafiz Hanzalah) National Anthem
10:15 – 10:25 a.m.	**Welcome Note** **Prof. Dr. Ejaz Cheema** *Conference Chair & Founding Dean, SPH, UMT, Lahore, Pakistan*
10:25 – 10:35 a.m.	**Welcome Note** **Dr. Asif Raza** *Honorable Rector, UMT*
10:35 – 10:55 a.m.	**Keynote Speaker** **Dr. Sohail Asif Qureshi** *Director of Research and Innovation- Shalamar Institute of Health Sciences*
11:00 – 11:20 a.m.	**Keynote Speaker** **Dr. Rizwan Mehmood** *Pharmaceutical Expert (PhD, UK)*
11:25 – 11:45 a.m.	**Keynote Speaker** **Mr. Sajjad Hafeez** *Chief Operating Officer- Highnoon*
11:50 – 12:10 p.m.	**Keynote Speaker** **Prof. Dr. Zohra Khanum** *Obstetrician & Gynecologist, Health Profession Educationist* *Principal Services Institute of Medical Sciences*
12:15 – 12:25 p.m.	**Speech** **Chief Guest** **Dr. Adeel Abbas Haideri** *CEO Highnoon Laboratories*
12:25 – 12:35 p.m.	**Speech** **Honorable Chairman and President, UMT and ILM Trust** Mr. Ibrahim Hasan Murad

12:35 – 01:00 p.m.	**Souvenir Distribution**
01:00 – 02:00 p.m.	**LUNCH & PRAYER BREAK**
02:00 – 02:20 p.m.	**Keynote Speaker** **Prof. Susannah Hart** *Co-Founder of the Medical Education Guild* *Professor of Health Care and Chair of the Scientific Advisory Board, University of Cambridge*
02:20 – 02:40 p.m.	**Keynote Speaker** **Dr. Salim Razi** Canakkale Onsekiz Mart University (COMU), Türkiye
02:50 – 03:30 p.m.	**Panel Discussion** **Topic: Promoting Interprofessional Education and Practice** *Panelists: Dr. Omar Akhlaq Bhutta, Dr. Azhar Awan, Dr. Sajid Hameed, Dr. Salman Bashir, Dr. Ejaz Cheema* *Moderator: Dr. Sarah Rehman*
03:30 – 04:15 p.m.	**Tea, Networking & Poster Exhibition** *(Venue: MC-03)*
04:15 – 04:30 p.m.	**Award Distribution to Best Poster Presenters** *by CLINIX*
04:30 – 05:30 p.m.	**ENTERTAINMENT**

Day 2: 29th January 2025

Venue: Hakeem Saeed Hall, University of Management and Technology, Lahore, Pakistan

Host Ms. Tangina Malik (SPH)

10:00 – 10:15 a.m.	Introduction Recitation of Holy Quran (Mr. Hafiz Hanzalah) National Anthem
10:20 – 10:30 a.m.	**Speech** **Prof. Dr. Asghar Zaidi** *Provost, UMT*
10:30 – 10:50 a.m.	**Keynote Speaker** **Dr. Zaheer Ahmad** *Project Director* *Directorate of Digital Learning and Skills Enhancement*
10:55 – 11:15 a.m.	**Keynote Speaker** **Dr. Rehan Gul** *Radiopharmacy head and QAR safety coordinator at nuclear medicine department SKMCH and RC Lahore*
11:20 – 11:40 a.m.	**Keynote Speaker** **Dr. Tahir Khan**

	Director of the Institute of Pharmaceutical Sciences (IPS) at the University of Veterinary and Animal Sciences (UVAS)
11:50 – 12:50 p.m.	**Panel Discussion Hosted by Highnoon** **Topic: Lifestyle Changes to Break the Link of Diabetes** *Panelists* 1. Prof Dr Ali Asghar Jawa (Endocrinologist) 2. Prof Dr Mujhtaba Hassan (Endocrinologist) 3. Prof. Dr Junaid Zafar (Cardiologist)
12:50 – 01:00 p.m.	**Souvenir Distribution**
01:00 – 02:00 p.m.	**LUNCH & PRAYER BREAK**
02:00 – 02:40 p.m.	**Workshop 1** *Dr. Majid Ali* *Topic: Transformative role of AI in healthcare education*
02:40 – 03:10 p.m.	**Workshop 2** **Dr Mahmoud Mohamed** *Department of Radiology, Charité - Universitätsmedizin Berlin, Berlin, Germany* *Topic: Health Insights with R: A Hands-On Workshop in Statistics & Machine Learning*
03:10 – 03:50 p.m.	**Workshop 3** *Dr. Waqar Aman, Dr. Tahir Chohan* *Topic: Hands on practice session* *Molecular docking studies by using Maestro Schrodinger*
03:50 – 04:10 p.m.	**TEA**
04:10 – 05:00 p.m.	**Oral Presentations**
05:00 – 05:10 p.m.	**Award Distribution**
05:10 – 05:20 p.m.	*Remarks by* **Chief Guest**
05:20 – 05:30 p.m.	*Closing Remarks by* **Prof. Dr. Abid Sherwani**
05:30 – 05:40 p.m.	*Closing + Group Photo*

CONFERENCE ABSTRACTS

HCIC-01-2025

Oncolytic Measles Virus Encapsulated in Thiolated Chitosan-Based CD44 Targeted Delivery: A Multi-Parametric Analysis of Targeted Oncolysis in a Prostate Xenograft Model

Faiza Naseer

Shifa College of Pharmaceutical Sciences, Shifa Tameer e Millat University, Islamabad, Pakistan

ABSTRACT

The oncolytic measles virus (OMV) strain has demonstrated oncolytic activity, but a notable limitation is immune neutralization mediated by Natural Killer cells and macrophages *in vivo*. OMV-loaded nanoparticles were prepared using the ionic gelation method. The expression of antibodies, including Caspase-I, COX-II, NFκB, and TNF-α in prostatic adenocarcinoma (PRAD) compared to GTEx and TCGA data, was explored using GEPIA, along with their impact on overall survival and disease-free survival in PC patients' post-treatment. OMV-loaded nanoparticles exhibited higher cytotoxicity and cell viability, as determined by MTT and trypan blue assay. They also demonstrated dose and time-dependent cytopathic effects in PC3 cells, with a TCID50 of 4.2 compared to naked OMV. OMV-loaded nanoformulations showed 49.5% cell death, 54.3% cell cycle arrest at the G2/M phase, 8.1% at G0/G1, and 5.7% at the S phase, with significant mitochondrial membrane potential (MMP) at 50µg/ml, as assessed by flow cytometry (FACS). In vivo, xenograft analysis was conducted on Wistar rats immunocompromised using ketoconazole (10mg/kg), cyclosporine (30mg/kg), and 0.1 µg/ml of Amoxicillin. On day 7, WBC profiling confirmed immunosuppression and tumor implantation with PC3 cells. Histopathology of organs from OMV-loaded nanoformulation-treated rats revealed syncytia formation in tumors, and immunohistochemical analysis indicated a decrease in TNF-α, Caspase-1, and NLRP3, confirmed by ELISA. Encapsulating the weak attenuated measles virus in thiolated chitosan and CD44 targeting improves the retention and sustained release of virus in tumors compared to pure OMV. This approach enhances oncolytic effect both in vitro and *in vivo*, overcoming immune neutralization.

Keywords: oncolytic measles virus, nanoparticle formulation, prostate cancer, immune neutralization, sustained drug release

HCIC-02-2025

Poly-L-lysine Multi-Functionalized Muco-Penetrating Self- Emulsifying Drug Delivery System (SEDDS) for targeted delivery of Ciprofloxacin against Intracellular *Salmonella typhi*

Rabia Arshad[1], Tanveer A. Tabish[2], Abbas Ali Naseem[3], Muhammad Rauf ul Hassan[4], Irshad Hussain[5], Shahzad Shaikh Hussain[6], and Gul Shahnaz[7]

[1]Faculty of Pharmacy, The University of Lahore Lahore, Pakistan
[2]UCL Cancer Institute, University College London, London, UK
[3]Department of Earth Sciences, Quaid-i-Azam University, Islamabad, Pakistan
[4]Pulmonology Department, Quaid-i-Azam Medical College, Victoria Hospital Bahawalpur, Pakistan
[5]Department of Chemistry & Chemical Engineering, SBA School of Science & Engineering, (SBASSE), Lahore University of Management Science (LUMS), DHA, Lahore, Pakistan
[6]National Institute of Health Islamabad, Pakistan Drugs Control and Traditional Medicines Division, Pakistan
[7]Department of Pharmacy, Faculty of Biological Sciences, Quaid-i-Azam University, Islamabad, Pakistan

ABSTRACT

Salmonella typhi infections are challenging to treat due to the poor penetration of the antibiotic ciprofloxacin (CIP) into the intracellular compartments of macrophages, which is caused by its low solubility and oral bioavailability. This poor penetration and dissolution lead to the development of multi-drug resistance and resistant biofilms. To address this, we developed a novel muco-penetrating self-emulsifying drug delivery system (SEDDS) for CIP to target intracellular Salmonella typhi with high specificity and selectivity. We selected oleic oil, Tween 80, and PEG 200 as the oil, surfactant, and co-surfactant based on their solubilizing capacity and emulsification capability. The muco-penetration feature of the SEDDS was enhanced by incorporating poly-L-lysine functionalized carbohydrates (mannose, preactivated hyaluronic acid) co-block pluronic F127 (PLL-M-PTHA-F127) polymeric excipient. This created an amphiphilic muco-penetrating targeted antibacterial entity for intracellular targeting of Salmonella typhi reservoirs. We characterized these self-nanoemulsifying carriers using dynamic light scattering (DLS), transmission electron microscopy (TEM), Fourier transform infrared (FTIR) spectroscopy, differential scanning calorimetry (DSC), x-ray diffraction (XRD), and thermogravimetric analysis (TGA). The observed hydrodynamic diameter of PLL-M-PTHA-F127 SEDDS was 247 nm with low PDI and negatively charged zeta potential, indicating stabilization of the formulation. In vitro drug release kinetics showed 85% sustained release within 72 hours under sink conditions. The PLL-M-PTHA-F127 SEDDS of CIP demonstrated strong antibacterial activity against Salmonella typhi strains even at low concentrations and were found to be hemocompatible and biocompatible. The intracellular survival rate of Salmonella typhi was significantly reduced with PLL-M-PTHA-F127 SEDDS compared to CIP alone. Fluorescence microscopy confirmed efficient cellular uptake within macrophages and rapid dispersion/clearance of gallstone biofilms compared to other formulations and CIP. In summary, PLL-M-PTHA-F127 SEDDS of CIP appears to be an ideal candidate for eradicating intracellular Salmonella typhi.

Keywords: ciprofloxacin, self-emulsifying drug delivery system (SEDDS), intracellular Salmonella typhi, muco-penetrating nanoparticles, PLL-M-PTHA-F127 polymer, biofilm clearance, targeted drug delivery, macrophage uptake.

HCIC-03-2025

Exosomes: Nature's Nanotechnology Tools for Intercellular Communication for Theragnostic Uses

Aima Bhatti[1], Kh. Muhmmad Mowahid Haider[1], and Khawaja Husnain Haider[2]

[1]Sargent College of Health and Rehabilitation Sciences, Boston University, Boston, Massachusetts
[2]Department of Basic Sciences, Sulaiman AlRajhi University, AlQaseem, Kingdom of Saudi Arabia

ABSTRACT

Exosomes are nature's nanotechnology product, which is being assessed for its theragnostic applications from a clinical perspective. With mesenchymal stem cells (MSCs) emerging as LIVING BIO-DRUGS reaching phase III assessment in patients, their derivative exosomes have caught special attention for their therapeutic efficacy in treating diverse pathologies, including peripheral nerve injuries (PNI), neural repair and regeneration, myocardial infarction, etc. Their applications for diagnosis and treatment as part of the cell-free therapy approach highlight the advancements in this area of research that have been made to date. The exosomes of MSCs that are released as part of their paracrine activity have recently been understood to exhibit significant roles in intracellular communication, promoting cardioprotective effects by modulating inflammation, promoting cell survival, and stimulating cardiomyogenic and vasculogenic differentiation, among other positive, noteworthy effects. Primarily, myocardial repair and recovery have been linked to cardiomyogenesis, regional blood flow restoration, and attenuation of infarct size, thus leading to recovery and preservation of cardiac pump function. Our systematic literature search delves into MSC-derived exosome-based therapy, providing an overview of the clinical significance of exosome-based theragnostic in overcoming the limitations posed by contemporary methods and as an alternative modality. However, further research into its complete clinical applications is still necessary.

Keywords: exosomes, mesenchymal stem cells, cell-free therapy, myocardial repair, neural regeneration

HCIC-04-2025

Enhanced Cytotoxicity of 5-Fluorouracil Against Skin Cancer Cell Lines and 3D Spheroid Tumor Model Using Solid Lipid Nanoparticles

Ahsan Ali[1, 4], Asadullah Madni[2], Nasrullah Jan[3], Hassan Shah[2], Safiullah Khan[2], Afifa Shafiq[2], Vladimir Torchilin[4], Muhammad Imran Khan[5], and Muhammad Abdur Rahim[3]

[1]Department of Pharmacy, The University of Lahore, Sargodha, Pakistan
[2]Department of Pharmaceutics, The Islamia University of Bahawalpur, Pakistan
[3]Department of Pharmacy, The University of Chenab, Gujrat, Pakistan
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ABSTRACT

This study aimed to develop solid lipid nanoparticles containing 5-fluorouracil (5-FU loaded PGSLNs) to achieve desired physicochemical properties and to enhance in vitro cytotoxicity against monolayered and 3D spheroid skin tumor models. 5-FU loaded PGSLNs were prepared via cold homogenization using Glyceryl Palmitostearate (GP) and Geleol® as solid lipids and Poloxamer 188 and Tween 80 as surfactant and co-surfactant, respectively. The developed nanoparticles were then physiochemically characterized, and cytotoxicity was evaluated against monolayered and 3D spheroid skin tumor models using the Cell TiterBlue® Assay and Cell-Titre Glo assays, respectively. The cellular uptake behavior of nanoparticles against monolayered and 3D spheroid tumor models was studied through flow cytometric analysis and fluorescence microscopic analysis. Nanoparticle sizes ranged from 116.3 ± 1.19 to 235.13 ± 1.15 nm, with a PDI < 0.45, and zeta potential was found to be between − 33.67 ± 0.40 and −19.37 ± 0.25. FTIR analysis revealed no chemical interactions among components, and Differential Scanning Calorimetry showed the thermal stability of the drug in nanoparticles. The in vitro drug release profile depicted biphasic release behavior, with 30–35% burst release within 3 h and sustained release for 48 h. Enhanced cytotoxicity was observed against monolayered skin tumor models (B16F10, A375, and A431) and a 3D spheroid skin tumor model (A431). Rhodamine-labeled PGSLNs showed increased uptake in monolayered models via fluorescence microscopy and flow cytometry, with enhanced uptake in 3D spheroid models confirmed by fluorescence microscopy. The hemocompatibility assay indicated the safety of nanoparticles at physiological levels. The designed solid lipid nanoparticles significantly enhanced the cytotoxic effect of 5-FU against monolayered and 3D spheroid skin tumor models and can be used as promising approach for skin cancer.

Keywords: 5-FU, Glyceryl Palmitostearate, skin tumor model, solid lipid nanoparticles

HCIC-05-2025

Aloe vera-Based Polymeric Network: A Promising Approach for Sustained Drug Delivery, Development, Characterization, and In Vitro Evaluation

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ABSTRACT

The present study was conducted to fabricate and characterize mucilage-based polymeric networks of Aloe vera for controlled drug release. Aloe vera mucilage was used to develop a polymeric network via the free-radical polymerization method using potassium persulphate as the initiator, NN-Methylenebisacrylamide as the crosslinker, and acrylamide as the monomer. Using varying concentrations of Aloe vera mucilage, crosslinker, and monomer, we developed different formulations. Swelling studies were conducted at pH 1.2 and 7.4. Concentrations of polymer, monomer, and crosslinker were optimized as a function of swelling. Porosity and gel content were calculated for all samples. FTIR, SEM, XRD, TGA, and DSC studies were conducted for the characterization of polymeric networks. Thiocolchicoside was used as a model drug to study the in vitro release in acidic and alkaline pH. Various kinetics models were applied by using a DD solver. Increasing content of monomer and crosslinker swelling, porosity, and drug release decreased while gel content increased. An increase in Aloe vera mucilage concentration promotes swelling, porosity, and drug release of the polymeric network but decreases gel content. The FTIR study confirmed the formation of crosslinked networks. SEM indicated that the polymeric network had a porous structure. DSC and XRD studies indicated the entrapment of drugs inside the polymeric networks in amorphous form. The analytical method was validated according to ICH guidelines in terms of linearity, range, LOD, LOQ, accuracy, precision, and robustness. Analysis of drug release mechanism revealed Fickian behavior of all formulations. All these results indicated that the M1 formulation was considered to be the best polymeric network formulation in terms of sustaining drug release patterns.

Keywords: aloe vera mucilage, polymeric network, controlled drug release, swelling studies, fickian behavior

HCIC-06-2025

Anti-Proliferative and Apoptotic Effects of *Acacia modesta* and *Opuntia monocantha* Extracts on HeLa Cells

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ABSTRACT

Cancer remains one of the leading causes of mortality worldwide. Numerous phytochemicals derived from plants have demonstrated antineoplastic properties by inducing programmed cell death (apoptosis). This study aimed to investigate the anti-proliferative and apoptosis-inducing activities of *Acacia modesta* and *Opuntia monocantha* extracts against HeLa cells. Ethanolic extracts of the plants were prepared to evaluate their anti-proliferative effects on HeLa cells. The MTT assay was conducted at concentrations of 100, 200, and 400 µg/mL to assess cell viability. Antioxidant activities, including glutathione reductase (GSH), superoxide dismutase (SOD), and catalase, were analyzed. Additionally, enzyme-linked immunosorbent assay (ELISA) and immunocytometry for p53 expression, along with flow cytometry, were performed to determine apoptosis induction. The MTT assay demonstrated a significant reduction in cell proliferation in groups treated with *Opuntia monocantha* and *Acacia modesta* compared to untreated controls. Antioxidant assays revealed decreased activities of GSH, SOD, and catalase in treated groups. ELISA and p53 immunocytometry further confirmed enhanced apoptosis in treated cells. Flow cytometry corroborated these findings, indicating higher apoptotic rates in the treated groups. These results suggest that *Acacia modesta* and *Opuntia monocantha* extracts effectively induce apoptosis, inhibit cell proliferation, and modulate antioxidant activity in HeLa cells. These findings highlight their potential as therapeutic agents for cancer treatment.

Keywords: apoptosis induction, cancer therapy, phytochemicals, Hela cells, antioxidant activit

HCIC-07-2025
Disturbance in Mitochondrial Dynamics by the Active Constituent of TWHF in Hepatocytes

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ABSTRACT

The term drug-induced liver injury (DILI) is used for liver damage which may occur due to prescription and non-prescription drugs. DILI cases are increasing year by year in China due to a wide range of drugs ranging from dietary supplements, health products, and natural medicines to traditional Chinese medicines. Traditional Chinese medicines include medicinal herbs and non-herbal things or compounds prepared from herbal/non-herbal ingredients following the protocols of traditional Chinese medicines theories. Traditional Chinese medicines are used for therapeutic purposes for different kind of diseases throughout the history. However, they account for 23% of total DILI cases in China. Among them, *Tripterygium wilfordii* Hook f. (*Tripterygium wilfordii*) is a famous plant used as a therapeutic agent. Triptolide, is an active ingredient of Chinese herbal plant TWHF. It has various pharmacological activities such as anti-inflammatory, anti-cancer, immunomodulatory, anti-fertility activity. However, it has narrow therapeutic window and multi-organ toxicities i.e. immunotoxicity, reproductive toxicity, nephrotoxicity and hepatotoxicity. Among other toxicities, triptolide induced-hepatotoxicity has major concern. L02 cell line was used for study. Our study has reported that triptolide caused an increase in ROS generation, mitochondrial depolarization and apoptosis in L02 cell line, confirmed by flow cytometry. IC50 value of triptolide in L02 cell line was 80 nM. Further we have studied that triptolide caused an imbalance in mitochondrial dynamics confirmed by PCR results and western blot results. These results concluded that triptolide produced mitochondrial toxicity in L02 cell line.

Keywords: drug induced liver injury, triptolide, hepatotoxicity, L02, ROS, apoptosis

HCIC-08-2025

Keeping Neurotransmitters on Track: Folding and Trafficking in Focus

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ABSTRACT

The transfer of material between organelles is mediated by carrier vesicles. Each vesicle transport reaction can be divided into four essential steps: vesicle budding, transport, tethering, and fusion. The exocyst is a multiprotein complex required by many membrane proteins for delivery to and insertion into the plasma membrane. Uptake through the neurotransmitter transporters for example dopamine transporter (DAT) represents the primary mechanism used to terminate dopaminergic transmission in the brain. However, little is known about the specialized trafficking of DAT towards the target membrane. DAT requires an intact C-terminal PDZ-binding motif to reach the cell surface, whereas the closely related serotonin transporter SERT does not. Here, we tested the hypothesis that DAT requires the exocyst for reaching the cell surface. HEK 293 or CAD cells were transiently co-transfected with plasmids encoding the wild-type dopamine transporter (DAT) and serotonin transporter (SERT) along with different components of the exocyst, i. e. Exo70, Sec6 and Sec8 using jetPRIME (Polyplus). Radioligand uptake, confocal laser scanning microscopy and immunoprecipitation experiments were performed 48 h after transfection to study the effect of exocyst components on trafficking of DAT and SERT. DAT relied on the exocyst to reach the cell surface. Surprisingly, SERT did not require the exocyst complex to reach the cell surface, regardless of whether the experiments were performed in HEK 293 cells (a cell line of fibroblast origin) or in CAD cells (a Cath.a-cell-derived line of neuronal origin) membrane. We found that three components of the exocyst complex, Sec6, Sec8 and Exo70, separately control trafficking of DAT. Immunoblots also showed the effect of exocyst components on trafficking of DAT as compared to SERT as control. The exocyst mediates DAT targeting to the presynaptic membrane. Identification of proteins as DAT-interactors along with the molecular bases and physiological significance of such interactions will result in a better understanding the role DAT plays in regulating dopamine homeostasis in the brain.

Keywords: vesicle transport, exocyst complex, dopamine transporter, serotonin transporter, membrane trafficking

HCIC-09-2025

Synergistic Antidiabetic Activity of Caesalpinia Bonduc (L.) Roxb. and Gymnema Sylvestre (Retz.) R. Br. in Diabetic Rats Via Restoring Insulin Secretion and Inhibiting Oxidative Stress

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ABSTRACT

Diabetes is a common systemic disorder, which is responsible for many morbidities and mortalities worldwide. This study was planned to assess the Phyto-actives, anti-oxidant, and pancreatic-protective effects of *G. sylvestre* leaves (GSL) and *C. bonduc* seed kernels (CBSK) hydro-methanolic extract in alloxan-induced diabetic rats. Diabetes was induced by injecting the intraperitoneal alloxan monohydrate at the dose of 120 mg/kg to Wistar rats. After induction of diabetes metformin (150 mg/kg. b. w), CBSKE (400 mg/kg b. w), GSLE (400 mg/kg b. w) and CBSKE+GSLE (200+200 mg/kg b. w) were administered to diabetic rats. Before the in-vivo experiment; in-vitro phytochemical HPLC analysis, proximate and mineral analysis, and DPPH assay were executed for the standardization of both extracts. The diabetic rats except diabetic control were treated with metformin, CBSKE, GSLE, and CBSKE+GSLE for four weeks. The extent of pancreatic damage and repair was measured by analyzing serum biochemical parameters, pancreatic tissue antioxidant assay, and histopathology. Results revealed that treatment with metformin, CBSKE, GSLE, and CBSKE+GSLE neutralized the ROS and normalized the levels of serum glucose, insulin, glucokinase and antioxidants as compared to diabetic control. Histopathological analysis revealed that CBSKE, GSLE, and CBSKE+GSLE ameliorated the toxic effect of alloxan and normalized the liver and β-cells of the pancreas. The role of cellular stress and cellular defense pathways are indispensable to know the underlying mechanism of ROS generation and its control, as high expression levels of Nrf-2, Gclc, Gclm, and decreased expression of MAPK-8, Traf-4, Traf-6, and KEAP-1 genes were detected in treated groups in contrast to diabetic control. CBSKE, GSLE, and CBSKE+GSLE treated groups also indicated improvement in β-cells function by increasing the expression levels of INS-1, INS-2 & Pdx-1 genes.

Keywords: diabetes management, Gymnema sylvestre, Caesalpinia bonduc, hydro-methanolic extract, alloxan-induced diabetic model, oxidative stress, pancreatic protection, ROS neutralization, gene expression modulation, β-cell function improvement.

HCIC-10-2025

Formulation and Evaluation of Beta-Cyclodextrin-Based Nanosponges of Clotrimazole

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ABSTRACT

The purpose of the current research is to formulate clotrimazole-loaded beta cyclodextrin-based nanosponges that seem to be effective for treating fungal infections. Beta-cyclodextrin and polyvinyl alcohol (PVA), that act as a rate-retarding polymer and surfactant, respectively, were utilized in different concentrations, and other chemicals dimethylsulfoxide (DMSO) to manufacture clotrimazole-loaded nanosponges (NS) through emulsion solvent diffusion technology. Antifungal drug Clotrimazole loaded beta cyclodextrin based nanosponges formulated and evaluated for the purpose of studying physiochemical characteristics. Fourier Transform Infrared spectroscopy (FTIR), Scanning electron microscopy (SEM) were used for structural analysis. Analysis of surface morphology and particle size of nanosponges was performed. Spherical, spongy, porous, and nanosized three-dimensional structure was shown by scanning electron microscopy. The particle size of each formulation was in the range of nano size. The percentage yield was in the range of 83% to 92%. The entrapment efficiency and drug loading were in the range of 80% to 91%,75%, and 85% respectively. Further analyses include FTIR, DSC, for physicochemical characterization studies. The development of inclusion complexes with porous and spherical morphology was verified by Fourier Transform Infrared spectroscopy (FTIR) without any chemical interaction between drug and polymer. Thus, according to physicochemical evaluations, manufactured NS also showed drug-polymer compatibility, drug encapsulation, & non-crystalline drug state in the spherical NS. Particle size, poly dispersive index (PDI), zeta potential, and entrapment efficiency was analyzed for nanosponges (NS). This research manufactured nanosponges with a porous character that offers a channel for the release of the drug, and the method is efficient and predictable.

Keywords: clotrimazole, beta-cyclodextrin, nanosponges, antifungal, drug delivery, emulsion solvent diffusion, physicochemical characterization, FTIR, SEM

HCIC-11-2025
Self -Dissolving Microneedle Technology for Transdermal Drug Delivery System

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ABSTRACT

The main aim of this study is to design a drug delivery system that can overcome the limitations of traditional transdermal drug delivery, such as poor skin permeability. These small, minimally invasive devices create microchannels in the skin, allowing for enhanced penetration of therapeutic agents.By bypassing the stratum corneum (the outermost skin layer), microneedles enable the delivery of larger molecules and vaccines that typically cannot pass through the skin barrier. Microneedles (MNs) are fabricated using materials like silicon, polymers, or metals through techniques such as photolithography or micromolding. The MN's can be solid, hollow, or coated with drugs, depending on the delivery method. Solid MNs allow for drug loading on the surface, while hollow MN's deliver the drug directly through microchannels. The MN patch is applied to the skin, creating microchannels that enhance drug penetration. In vitro and in vivo studies are conducted to assess drug release, skin penetration depth, and therapeutic efficacy by analysing drug levels in skin samples or plasma. Microneedles (MN's) offer an effective, minimally invasive approach for transdermal drug delivery, creating microchannels in the skin to enhance absorption of a variety of therapeutic agents, including vaccines and peptides. These devices provide a pain-free alternative to traditional injections, improving patient comfort and compliance, especially for chronic treatments or vaccine administration. Microneedle designs, such as solid, coated, and hollow types, use biocompatible materials like polymers and metals to optimize drug delivery. Microneedles hold significant potential to transform drug delivery by offering a needle-free, patient-friendly solution. Microneedles represent a revolutionary advancement in transdermal drug delivery, offering effective alternative to injection-based therapies. They show great promise in delivering a wide range of therapeutic agents including proteins, vaccines and such drugs that are difficult to deliver through the skin. As research and development continue, microneedles are set to play a key role in improving healthcare delivery, particularly for chronic conditions and vaccine administration.

Keywords: microneedle, skin permeation, transdermal drug delivery system

HCIC-12-2025

Formulation and In-Vitro Evaluation of Polymers Blend Based Diclofenac Sodium Microparticles for Sustained Release Drug Delivery.

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ABSTRACT

The purpose of research was to formulate polymeric blend-based Diclofenac sodium microparticles for sustained release drug delivery. The diclofenac sodium microparticles were formulated by emulsification and solvent evaporation method. The diclofenac loaded microparticles were evaluated or characterized for different parameters such as, micrometric properties, particle size, particle shape measurement, encapsulation and loading efficiency, FTIR, dissolution and drug release kinetics studies. Compact white spherical shaped microparticles of Diclofenac sodium microparticles were observed under optical microscope with a size of 169 - 552 µm. All formulation showed good percentage yield (96-100%). There was no effect of either increased or decreased concentration of polymers observed. Concentration of polymers and sustained release behavior of drug was directly proportional. In-vitro drug release study was performed in 0.2M HCl (pH 1.2) for first 2 hours, then followed by 0.2 M phosphate buffer solution (pH 6.8) for next 6 hours. The drug release from microparticles was irregular diffusion process. From the study, it was evident that a suitable combination of polymers is necessary to achieve desired effects. Diclofenac Sodium microparticles can be used to reduce adverse effects and increase the patient compliance.

Keywords: diclofenac sodium, microparticles, sustained release, emulsification method, drug release kinetics

HCIC-13-2025

Acute toxicity study on ethanolic extract of *Alpinia officinarum* and methanolic extract of *Hymenocrater sessilifolius* in albino rats

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ABSTRACT

To evaluate the safe dose range of *Hymenocrater sesslifolius* extract and *Alpinia officinarum* extract, the acute oral toxicity study was performed in albino rats. *Hymenocrater sessilifolius* is used by locals to treat fever, giddiness, kidney stones, cardiovascular diseases, wounds, Infections caused by bacteria and fungi while *Alpinia officinarum* is also used for the treatment of stomach pain, treating cold, invigorating the circulatory system and decreasing swelling. No study of the potential toxicity of these plants has been described. The Organization for Economic Co-operation and Development guideline was employed for the toxicity study. *Hymenocrater sesslifolius* extract and *Alpinia officinarum* extract were administered orally. The sighting study was performed on rats, with following doses of plant extract 5, 50 300 and 2000 mg/kg body weight. Furthermore, the highest dose, 2000 mg/kg body weight was selected for the main test of the acute oral toxicity experiment. In the study of a single dose of 2000 mg/kg, and general behavior, adverse effects, and mortality were studied for 14 days. Animals' body weight was observed, blood was collected for hematological, biochemical parameters, and vital organs were collected for gross necroscopy observation after sacrificing test and control group animals. Data was statistically analyzed by using one-way ANOVA, Bonferroni for comparison in Graph Pad Prism. In acute toxicity assay, there was no significant alteration in body weight, physical signs, symptoms, hematological, biochemical parameters, and body organ weights was found when compared to the normal group. The liver, kidney, and stomach did not show any gross necroscopy. The result indicates that the oral administration of *Hymenocrater sesslifolius* extract and *Alpinia officinarum* extract did not cause any toxicological effects. Hence, they could be regarded as safe natural products for therapeutic use.

Keywords: *Hymenocrater sesslifolius*, *Alpinia officinarum*, extract, toxicity, toxicology, safety

HCIC-14-2025

Acute and Chronic Toxicity Studies of Crude Methanolic Extract and Chlorofrom Fraction of *Heliotropium crispum* Desf.

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ABSTRACT

Heliotropium crispum Desf. (Boraginaceae) is an important plant used traditionally to cure kidney stones, burning sensation and skin diseases [1-7]. Present study was conducted to establish scientific safety profile by performing acute and chronic studies in wistar rat model. CME (crude methanolic extract) and fractions *i.e*. n-hexane, chloroform, ethyl acetate and n-butanol were prepared by fractionation method. Acute toxicity testing of CME was performed under the OECD guidelines using graded dose response and LD_{50} was determined. Toxicity signs were initially observed for 24 hrs and continued for further 5 days. Chronic toxicity of CME and chloroform fraction (1000, 2000 and 5000 mg/Kg/orally/day for 21 days) on rat model followed by biochemical and hematological analysis along with histological examination of liver, pancreas and kidney. No morbidity, mortality or any altered physiological or behavioral response was observed in acute toxicity study. Similarly, no signs and symptoms of toxicity were observed in chronic study. Body weight and organ coefficient measurement did not show any significant results when compared with normal control group. The chronic toxicity study also showed that *H. crispum* did not produce any significant change in hematological parameters when compared with normal control group. Similarly, ALT, AST and bilirubin levels did not show any significant change when compared with normal control group. Safety profile was further endorsed by histopathological analysis. Following study validate that CME and chloroform fraction of *H. crispum* were found safe and well-tolerated for internal use even at 5000 mg/Kg/day and it should be considered for enhancement of biological activities having lesser potential to induce toxic side effects.

Keywords: Heliotropium crispum, acute toxicity, chronic toxicity, safety profile, wistar rat model

HCIC-15-2025

Association of Estrogen Receptor Gene Variants with Breast Cancer Severity in a Pakistani Population

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ABSTRACT

Reproductive factors are known to increase the risk of breast cancer (BC) by contributing to lifetime estrogen exposure, a hormone that stimulates breast cell growth. Variants in the estrogen receptor (ER) alpha (*ESR1*) and beta (*ESR2*) genes have been implicated in BC risk across various populations. This study investigated the association of rs2228480 (*ESR1*) and rs3020314 (*ESR2*) variants with BC risk and severity within a Pakistani population. The study analyzed DNA from 90 sporadic BC patients. Genotyping was performed using Pyrosequencing, and data on epidemiological, clinical, and reproductive factors were collected. Statistical analysis included the χ^2 test, Fisher's exact test, and non-parametric methods such as the Mann-Whitney and Kruskal-Wallis tests, along with their parametric equivalents. The rs2228480*GG genotype showed a high frequency among ER-positive tumors (OR = 2.13; 95% CI = 1.189–3.816) and a minor association with clinical stage 0 (OR = 0.324; 95% CI = 0.116–0.904). The rs2228480GA* genotype correlated with lower ER expression, while rs2228480*GG was associated with higher progesterone receptor (PR) expression. The rs3020314CC* genotype was significantly more prevalent among women who breastfed (OR = 2.11; 95% CI = 1.203–3.702) and strongly associated with clinical stage 0 (OR = 4.383; 95% CI = 1.606–11.96). It also had a minor negative association with systemic arterial hypertension (OR = 0.53; 95% CI = 0.319–0.880). Although the rs2228480 and rs3020314 variants did not significantly alter the risk of sporadic BC, they were found to modulate disease severity, suggesting their potential role in influencing BC progression.

Keyword: breast cancer, estrogen receptor, pyrosequencing, genetic variants

HCIC-16-2025

Outpatient Satisfaction with Pharmacy Services in Government Hospitals in Lahore: An Age-Specific Analysis

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ABSTRACT

Patient satisfaction is a key indicator of pharmacy service quality, highlighting areas for improvement in pharmaceutical care. To evaluate outpatient satisfaction with pharmacy services across different age groups in government hospitals in Lahore, Pakistan. A cross-sectional study (December 2023–January 2024) assessed sociodemographic characteristics and satisfaction using a 23-item questionnaire in public hospitals. Statistical analyses compared satisfaction among young, middle-aged, and geriatric groups to find independent predictors of the outcomes. Among 484 participants, geriatric patients had significantly lower satisfaction scores compared to middle-aged and younger groups ($p<0.001$, n=146, 2.15±0.41 vs n=154, 2.22±0.40 vs n=184, 2.64±0.86 respectively). Increasing age was associated with an 83.7% higher likelihood of low satisfaction, while education and Punjabi ethnicity reduced these odds by 53.5% and 15.2%, respectively. In conclusion, Age-related disparities underscore the need for age-sensitive, patient-centered pharmacy services, focusing on improving elderly patients' experiences to enhance public healthcare quality in Lahore.

Keywords: patient satisfaction, pharmacy services, outpatient care, public hospitals, age variations

HCIC-17-2025

Evaluation of Anti-Arthritic Activity of Methanolic Extract of *Praecitrullus Fistulosus* in Albino Wistar Rats

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ABSTRACT

According to the World Health Organization, rheumatoid arthritis (RA) is among the most common chronic inflammatory illnesses. Joints often lose cartilage and bone when tendons and ligaments deteriorate. All of this joint degradation results in irregularities and bone erosion, which usually cause excruciating agony for the patient. Most of the time, it is treated primarily with a variety of immunosuppressive, corticosteroid, non-steroidal anti-inflammatory drug (NSAID), and disease-modifying anti-rheumatic medications (DMARDs), all of which have numerous adverse reactions. It has been demonstrated that using natural plants to treat rheumatoid arthritis is less expensive and safer. The current study was designed to assess the effects of methanolic extract from *Praecitrullus fistulosus* fruit in rheumatoid arthritic rats. The extract of *Praecitrullus fistulosus fruit* was prepared by using Soxhlet method. Phytochemical constituents such as polyphenols, tannins, flavonoids, glycosides and alkaloids were also identified in the methanolic extract of Praecitrullus fistulosus. Healthy young albino wistar rats (male) were used for this study weighing 120-150g and were randomly assigned into six groups. Single dose of adjuvant was used subcutaneously for the induction of rheumatoid arthritis into the rats. The 1st group was normal control, 2nd was rheumatoid arthritic adjuvant induced control group, 3rd was treated group with indomethacin, 4th, 5th and 6th were treated groups which are treated with methanolic Praecitrullus *fistulosus* extract at different doses. Testing of various parameters were done at 1st, 3rd and 6th week of the experiment to assess therapeutic outcomes of methanolic extract of *Praecitrullus fistulosus* fruit in examination. Data was analyzed statistically by using ANOVA and DMR. Results showed that methanolic *Praecitrullus fistulosus* fruit extract has effective ($p<0.05$) anti-rheumatoid arthritic properties due to the existence of polyphenols, tannins, flavonoids, glycosides and alkaloids and free radical scavenging activity. Histopathological studies of joints showed no inflammation, pannus formation and cartilage damage under electron microscope which means that methanolic extract of *Praecitrullus fistulosus* has beneficial effects on rheumatoid arthritis.

Keywords: Arthritis, *Praecitrullus fistulosus*, anti-arthritis, antioxidant, anti-inflammatory

HCIC-18-2025

Antiplatelet, Antithrombotic, and Antihypertensive Potential of Bergenia stracheyi: An *in-vitro* and *in-vivo* Study"

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ABSTRACT

Platelet aggregation, thrombosis and hypertension are key factor in the development of cardiovascular disease. *Bergenia stracheyi* is well-known in traditional medicine for its diverse applications including antifungal, antirheumatic, antiobesity, antioxidant, and anti-haemorrhoidal activities. However, its antiplatelet, antihypertensive and antithrombotic potential is not yet investigated. Firstly, present study aimed to investigate antiplatelet effect of aqueous ethanolic extract *Bergenia stracheyi* both in vitro using human blood samples and in vivo using a rat model while also assessing its antithrombotic potential. Inhibitory effect of ethanolic extract of *Bergenia stracheyi* on platelet aggregation was further evaluated by measuring bleeding time and conducting platelet aggregation induced by epinephrine and ADP. Meanwhile, the antithrombotic effect of plant extract was assessed by measuring prothrombin time, a coagulation parameter. The aqueous ethanolic extract of *Bergenia stracheyi* significantly prolonged bleeding time and showed the antiplatelet effect against both ADP and epinephrine-induced aggregation in vitro but not against epinephrine in vivo. The administration of aqueous ethanolic extract resulted in a prominent prolongation of prothrombin time. Secondly, for chronic antihypertensive effect, L-NAME (40mg/kg) was given to animals, orally for 4 weeks. The control group received only vehicle, treated groups were given crude extract of *Bergenia stracheyi* (125, 250, 500mg/kg) and captopril (20mg/kg) received by standard group. At the end of 4 week, all rats were anesthetized and blood pressure was measured by invasive blood pressure technique and blood samples were collected for lipid profile. On the basis of these results, it is concluded that the aqueous ethanolic extract of *Bergenia stracheyi* has antiplatelet and antithrombotic effects. The extract has significant dose dependent reduction in SBP, DBP and in MAP in anesthesized hypertensive rats as compared to the control group that received vehicle. Only 500mg/kg dose of the extract did not cause a significant reduction in MAP. Similarly, in L-NAME treated rats an increase in heart was observed. Crude plant extract doses of 125, 500 mg/kg caused significant reduction in heart rate. Similarly, decrease in TG, LDL, VLDL, TC levels while increase in HDL levels were observed.

Keywords: platelet aggregation, antithrombotic potential, antihypertensive effects, Bergenia stracheyi, lipid profile improvement

HCIC-19-2025

Exploring the perceptions and experiences of pharmacy students about the use of AI tools in the preparation of formative and summative OSCE: a mixed-methods study

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ABSTRACT

OSCEs have been extensively implemented in a variety of healthcare disciplines globally in both formative and summative formats for the evaluations of clinical competency. Understanding the perceptions of students regarding any assessment method is crucial for optimizing its design and implementation, ultimately enhancing educational outcomes. In this study, we aimed to explore the perceptions and experiences of pharmacy students about formative and summative OSCEs and the use of AI tools by adopting a mixed-methods approach, in order to capture quantitative and qualitative insights. This study, using a mixed-methods approach, explored pharmacy students' perceptions and experiences of formative and summative OSCEs and their use of AI tools in OSCE preparation. Formative and summative OSCE marks were compared. Further quantitative data were collected from 82 students (89.13%) via a post-OSCE questionnaire. Qualitative data were collected from 20 face-to-face semi-structured interviews that was audio-recorded, transcribed verbatim and thematically analyzed. Results showed a statistically significant improvement ($p<0.001$) in marks from formative to summative OSCE, with mean marks increasing from 44.2% to 56.0%. Students generally perceived the OSCE process positively, with the majority rating their overall experience as excellent (65%). The integration of AI tools in OSCE preparation was well-received, with 58.5% of students finding them helpful in OSCE preparation. However, challenges such as "lack of humanization" and occasional inaccuracies were noted. Themes generated from qualitative data endorsed the quantitative findings and were categorized into facilitators (briefing session, formative OSCE, feedback from role players and evaluators, AI tools) and barriers (challenges with the use of AI tools, anxiety, time management). The study highlights the importance of formative assessments prior to summative and the potential of AI tools in enhancing OSCE preparation but emphasizes the need for structured training and guidance.

Keywords: OSCE, Student perceptions, student experiences, mixed-methods, artificial intelligence

HCIC-20-2025

Formulation and Characterization of Neem (Azadirachta Indica) Oil Loaded Phospholipid Vesicles and Evaluation of Wound Healing Capability

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ABSTRACT

Neem oil is natural less toxic alternate to synthetic formulations containing antimicrobial and healing properties. Neem leaves were collected and processed to extract the active compounds by a sonication method to produce neem extract-based phospholipid containing nanoparticles. The size, shape, and stability of the neem nanoparticles were determined using dynamic light scattering and transmission electron microscopy techniques. The toxicity of the neem nanoparticles was evaluated using a cell-based assay on human skin fibroblasts. The cells were treated with increasing concentrations of the neem nanoparticles and observed cell viability and morphological changes. The effectiveness for wound healing was evaluated in a murine model. The mice were induced with a wound on their backs, and the neem nanoparticles were applied topically to one group of mice while the control group received saline. The wound healing process was monitored and compared between the two groups. The sonication method was successful in producing neem nanoparticles with an average size of 50 nm and a spherical shape and stable in aqueous solutions. The size and shape were found to be uniform and stable over time. Resulting nanoparticles showed a mean size distribution around 400 nm polydispersity < 0.2 and were stable for 120 days. The results of the toxicity assays showed that the neem nanoparticles were not toxic to human skin fibroblasts at the tested concentrations. No significant changes in cell viability or morphological changes were observed. The results of the wound healing study showed that the neem nanoparticles were effective in promoting wound healing and showed faster healing compared to the control group, with a significant reduction in wound size and improved tissue regeneration. Neem extract-based nanoparticles are a promising alternative for drug delivery, wound healing applications, non-toxic and effective for promoting wound healing.

Keywords: neem nanoparticles, wound healing, antimicrobial properties, sonication method, non-toxic drug delivery

HCIC-21-2025

Design, Synthesis and In-silico Evaluation of New Coumarin Derivatives

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ABSTRACT

Alzheimer's disease (AD) is the most common cause of dementia all over the world, ranked as sixth leading cause of death in developed countries. Various drug targets are available for the treatment of AD, however, the available therapies target cholinesterase and N-methyl-D-aspartate. In this study, coumarin nucleus was combined with other heterocyclic moieties to produce compounds with potential neuroprotective potential. The designed compounds were evaluated through molecular docking and MM-GBSA calculations to predict binding potential with various AD targets including acetylcholinesterase, butyrylcholinestrase, β-site amyloid precursor protein cleaving enzyme along with some inflammatory markers; TNF-α and NFκB. Total of 47 compounds were designed. D-10 showed highest binding affinity against various targets ranging from -6.404 Kcal/mol to -10.268 Kcal/mol. It was further subjected to molecular dynamics simulation studies. Physicochemical properties were also evaluated. These compounds can serve as leads for synthesizing further derivatives with multi-target neuroprotective potential. Synthesis of these compounds is the second phase of this study.

Keyword: coumarin, neuroprotection, drug discovery

HCIC-22-2025
Co-Milling of Oxcarbazepine with Soluplus for the Enhancement of Solubility and Dissolution Rate

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ABSTRACT

Poor solubility and dissolution rates affect the bioavailability of drugs. The aim of this study was to improve the solubility and dissolution rate of a poorly soluble drug, oxcarbazepine by its mechanochemical activation via the co-milling technique. The drug and Soluplus (in two different ratios) were co-milled in a planetary ball bill. The bulk properties, solubility, and dissolution rate were determined and differential scanning calorimetry, powder X-ray diffraction, Fourier-transform infrared spectroscopy (FTIR), and laser diffraction (for particle size determination) techniques were used to characterize drug and co-milled formulations. The results have shown good compressibility and excellent flow of co-milled mixtures as compared with the drug. The solubility of the drug (0.448±2 mg/ml) was increased by 2–3-fold in co-milled mixtures while the dissolution rate of oxcarbazepine was increased up to 2.5–3 times. Both differential scanning calorimetry and powder X-ray diffraction results have shown a reduction of crystallinity while the Fourier-transform infrared spectroscopy spectra indicated no interaction. Laser diffraction studies have shown ∼5 times reduction in mean particle size. The study concludes that co-milling is effective in enhancing solubility and dissolution of poor soluble drugs.

Keywords: co-milling, oxcarbazepine, solubility enhancement, dissolution rate, mechanochemical activation, Soluplus, bioavailability, differential scanning calorimetry

HCIC-23-2025
Flexible Topical Hydrogel Patch Loaded with Antimicrobial Drug for Accelerated Wound Healing

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ABSTRACT

A hydrogel topical patch of neomycin was developed by using sodium alginate (SA) and hydroxy ethyl cellulose (HEC) as polymers. Free radical polymerization in an aqueous medium was initiated by using acrylic acid (AA) and N,N′-methylene bisacrylamide (MBA). Prepared hydrogels were characterized for pH sensitivity and sol–gel analysis. In addition, the effect of reactant contents on the developed formulation was evaluated by swelling behavior. SEM assay showed the rough structure of the hydrogel-based polymeric matrix, which directly enhances the ability to uptake fluid. FTIR spectra revealed the formation of a new polymeric network between reactant contents. TGA and DSC verified that fabricated polymeric patches were more thermodynamically stable than pure components. Gel fractions increased with increases in polymer, monomer, and cross-linker contents. The swelling study showed the pH-dependent swelling behavior of patches at pH 5.5, 6.5, and 7.4. The release pattern of the drug followed zero-order kinetics, with diffusion-controlled drug release patterns according to the Korsmeyer–Peppas (KP) model. Ex vivo studies across excised rabbit skin verified the drug retention in the skin layers. The hydrogel patch effectively healed the wounds produced on the rabbit skin, whereas the formulation showed no sign of irritation on intact skin. Therefore, neomycin hydrogel patches can be a potential candidate for controlled delivery for efficient wound healing.

Keywords: neomycin, hydrogel patch, sodium alginate, pH sensitivity, wound healing

HCIC-24-2025
Nano Particulate Drug Delivery System for Glycoprotein-Based Vaccines

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ABSTRACT

The study explores nano-particulate drug delivery systems for glycoprotein-based vaccines, focusing on SARS-CoV-2 and Ebola virus. The research utilizes molecular surface representations and structural models to develop nanoparticle immunogens, such as the SARS-CoV-2 RBD-12GS-I53-50 nanoparticle. These systems aim to enhance the safety, stability, and efficacy of vaccines by improving antigen presentation and immune response activation. Synthetic nanoparticles, specifically interbilayer-crosslinked multilamellar vesicles (ICMVs), were designed to encapsulate glycoproteins such as the Ebola virus antigen. ICMVs were engineered to maintain antigen integrity and stability. In parallel, SARS-CoV-2 nanoparticle immunogens were developed using trimeric and pentameric components with icosahedral symmetry, displaying 60 receptor-binding domain (RBD) copies. ICMVs elicited robust immune responses in mice without requiring specialized lipids, activating germinal center B cells and T cells. For SARS-CoV-2, nanoparticle-based vaccines demonstrated structural integrity and enhanced antigen presentation through multivalent display. These results highlight the potential of nanoparticle systems to generate strong, targeted immune responses. The findings demonstrate the potential of nano-particulate delivery systems for glycoprotein-based vaccines. The encapsulated antigen structure preservation and multivalent display on nanoparticles improve immune responses, making these systems promising for developing effective vaccines against emerging pathogens like SARS-CoV-2 and Ebola. Further research is essential to optimize these platforms for clinical application.

Key words: nanoparticles, vaccines, glycoproteins, ebola virus

HCIC-25-2025

Fabrication and Characterization of Rosuvastatin-Loaded Nanosponges by Solvent Evaporation Method

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Abstract

Rosuvastatin, a statin medication, is widely used to treat hyperlipidemia. However, its poor aqueous solubility and low bioavailability hinder its therapeutic efficacy. To address this challenge, we developed rosuvastatin-loaded nanosponges using the solvent evaporation method.Nanosponges are a type of nanoparticle-based drug delivery system that has gained significant attention in recent years and are typically composed of a biocompatible and biodegradable polymer matrix that is loaded with a therapeutic agent.They have shown promise in treating various diseases, including cancer, infectious diseases, and inflammatory disorders.In this study, the nanosponges were characterized for their particle size, zeta potential, and entrapment efficiency. The optimized nanosponge formulation showed a particle size of 220 nm, zeta potential of -25 mV, and entrapment efficiency of 85%. In vitro release studies revealed a sustained release of rosuvastatin from the nanosponges over 24 hours.Moreover, in vivo toxicity studies were performed on animal model to study toxicity The nanosponges also demonstrated improved bioavailability and pharmacokinetic profile compared to the free drug. These results suggest that rosuvastatin-loaded nanosponges could be a promising strategy to enhance the therapeutic efficacy of rosuvastatin.

Keywords: rosuvastatin, nanosponges, poor solubility, sustained release, enhanced bioavailability

HCIC-26-2025
Nanotechnology in Drug Delivery System for Controlled Release Formulations

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ABSTRACT

The basic aim of research on nanoparticles in medicine is to develop advanced diagnostic, therapeutic, and drug delivery systems. Nanoparticles can target specific cells or tissues, enhancing drug efficacy and minimizing side effects. Researchers aim to improve the biocompatibility and scalability of these systems. Ultimately, the goal is to revolutionize healthcare by making treatments more efficient and personalized. Nanoparticle-based drugs work by leveraging their small size and surface properties to improve drug delivery and therapeutic effects. They can be designed to encapsulate drugs, protecting them from degradation and improving stability. Targeting ligands on their surface enable nanoparticles to bind to specific receptors on diseased cells, ensuring targeted delivery. Once at the target site, nanoparticles release their payload in a controlled manner, such as through pH, temperature, or enzyme-triggered mechanisms. This minimizes drug exposure to healthy tissues, reducing side effects. The use of nanoparticle drugs results in enhanced targeting of diseased tissues, improving treatment precision. They increase drug efficacy by delivering medications directly to the desired site while minimizing exposure to healthy tissues. This reduces side effects and enhances patient safety. Nanoparticles also improve drug stability and bioavailability, ensuring better therapeutic outcomes. Nanoparticles offering innovative solutions for complex medical challenges. They enable targeted therapies, improved drug stability, and early disease detection, transforming traditional treatment methods. These advancements have potential to redefine modern healthcare practices.

Key words: nanotechnology, enzymes, controlled release system

HCIC-27-2025
Pharmacometrics: Key role in Personalized Medicine

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ABSTRACT

Pharmacometrics quantifies the interactions between drug and patients by interlinking biology, physiology, pharmacology and disease condition by the use of mathematical models. In silico pharmacokinetics (PK) and pharmacodynamics (PD) dose simulations and modelling are the base for a pharmacometrics analysis. Pharmacometrics studies describe the use of computer-based modelling in dose optimization in various clinical situations. Non-linear mixed effect models (NONMEM) have been used the population based pharmacokinetic analysis. One of the unique features of NONMEM is the use of sparse data, that plays an advantage for the patients from whom sample collection is difficult including neonates, critically ill pediatrics and geriatrics patients. It is also very helpful in rare disorders where the sampling population is limited. The developed PK model establish relationships between PK parameters and patient's demographics which enables the clinicians to device the appropriate dosage regimen for individual patients. This ensures the treatment's safety and effectiveness in individual patients. Pharmacometrics has emerged as a valued tool in the pharmaceutical industry, regulatory agencies and academia to provide a scientifically based guideline on integration of preclinical and clinical data for designing the rational dosage regimen and treatment optimization. This technique is particularly important in lower middle-income countries (LMIC's) where the facilities for Therapeutic Drug Monitoring (TDM) are not fully established.

Keywords: pharmacometrics, treatment optimization, NONMEM, TDM and dose simulations

HCIC-28-2025

Innovative Solutions Shaping the Future of Healthcare on Landscape by the Innovation in Sustainable Healthy Food

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ABSTRACT

The evolving healthcare landscape is increasingly influenced by innovations in food science, which play a critical role in addressing global health challenges such as chronic diseases, malnutrition, and food security. As the demand for healthier, more sustainable diets grows, food science has made significant strides in developing novel approaches to nutrition, food production, and delivery. Innovations such as functional foods, plant-based alternatives, personalized nutrition, and biofortification are not only enhancing the nutritional quality of food but also offering targeted solutions to prevent and manage diseases like obesity, diabetes, and cardiovascular conditions. Additionally, advances in food processing, preservation, and packaging technologies are improving food safety, shelf life, and accessibility, while minimizing environmental impacts. The integration of precision agriculture and biotechnology holds the potential to revolutionize food production, making it more sustainable and resilient to climate change. However, these innovations must be approached with careful consideration of regulatory frameworks, ethical concerns, and equitable access to ensure their broad adoption and effectiveness. This paper explores the intersection of food science and healthcare, highlighting key innovations shaping the future of nutrition and food systems, and offering insights into how these solutions can contribute to a healthier, more sustainable world.

Keywords: functional foods**,** personalized nutrition**,** sustainable diets**,** plant-based alternatives**,** biofortification

HCIC-29-2025

Assessment of Knowledge, Attitude and Practices Regarding Storage and Disposal of Unused and Expired Medicines among community Pharmacists: A Cross-Sectional Study from Lahore, Pakistan

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ABSTRACT

Every year, a vast number of pharmaceutical items (medicines) are manufactured and utilized. But unfortunately, not all of these medicines reach their end-users and a large proportion of medicines remain unused and expired. Medicines collection in the home and improper disposal of unused and expired medicines may show major ramifications in terms of inappropriate drug distribution, unintentional child poisonings, and the diversion of pharmaceuticals for illegal use. The study aimed to determine community pharmacists' knowledge of unused and expired drugs, as well as their perceptions and practices surrounding their storage and disposal in households. A descriptive cross-sectional, quantitative, and non-experimental study was conducted with 400 participants from several community pharmacies in Lahore. Data were collected by using a convenient-sampling approach by using face-to-face interviews via structured questionnaires. Statistical Data analysis such as Descriptive statistics including frequencies and percentages were computed using SPSS (version 26.0), and the chi-square test was done for better findings related to participant qualification. Our study revealed that the majority of participants (98%) knew about "Expired Medications" and 73.3% heard about drug wastage. But unfortunately, 55% of participants didn't know about drug wastage and its harmful impact on the environment if discarded inappropriately and 67.3% were unaware of the proper disposable method for expired medicine. 53.8% considered that inadequate information is the concerning reason for improper management of unused and expired drugs. Shockingly, 83.6% of respondents never read disposal instructions for unused and expired medicine. Therefore, they would like to flush, burn and throw in the garbage. Our study found that our respondents do not have adequate knowledge and understanding of the management and proper disposal of unused and expired medicines. Guidelines for safe disposal are essential, as is an organized way of collecting old and expired medications.

Keywords: pharmaceutical waste, expired medications, community pharmacists, drug disposal practices, environmental impact

HCIC-30-2025
Mental Health in the Digital Age: Challenges and Opportunities

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ABSTRACT

In today's digital world, technology touches nearly every part of our lives, including how we experience and address mental health. On the bright side, digital tools like apps, telehealth, and online communities have made it easier than ever to find support. Whether it's accessing therapy from the comfort of home or connecting with others who understand what you're going through, these innovations break down barriers like cost, stigma, and location. But it's not all good news. The constant scroll of social media, with its picture-perfect portrayals of life, can leave us feeling anxious, inadequate, or isolated. Cyberbullying, misinformation, and the overwhelming flood of online content only add to the mental strain, especially for young people trying to find their place in the world. Finding balance is key. We need to teach people how to use technology mindfully, build safer online spaces, and encourage open conversations about mental health. Policymakers and tech creators also have a role to play in designing platforms that prioritize well-being over profit. Digital platforms can also be used to raise awareness and educate people about mental health, helping reduce stigma and offering practical solutions for improving well-being. If we can navigate these challenges with care and intention, the digital age offers a powerful opportunity to connect, heal, and grow in ways we've never imagined before. Let's use it wisely to create a healthier future for all.

Keywords: digital age, social media, cyberbullying, anxiety, depression, digital platforms, mental health awareness.

HCIC-31-2025

Knowledge of Fluoroquinolone Boxed Warnings Among Pharmacists in Lahore, Pakistan: A Cross-Sectional Study

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ABSTRACT

Despite FDA boxed warnings, fluoroquinolones remain widely prescribed, often due to limited awareness among healthcare professionals. In Pakistan, these antibiotics constitute a major portion of prescriptions, warranting an assessment of pharmacists' knowledge. To evaluate pharmacists' overall knowledge of fluoroquinolones and identify factors associated with knowledge levels. A cross-sectional study (May–Sept 2024) involving 271 pharmacists in Lahore, Pakistan, utilized a validated 40-item questionnaire to evaluate knowledge of fluoroquinolones. Domains included general knowledge, indications, adverse effects, and boxed warnings. SPSS v24 analyzed associations between knowledge scores and potential variables. The participants (mean age: 31.82 ± 5.19 years) were predominantly private-sector pharmacists (55.20% females). The cumulative average knowledge score was 64.46%. Domain-specific scores for general knowledge, indications, adverse effects, and boxed warnings were 3.06 ± 0.67, 7.65 ± 1.78, 11.01 ± 3.53, and 5.33 ± 1.34, respectively. The analysis revealed that increasing age, female gender, employment in the private sector, working in tertiary care hospitals and greater professional experience were independent predictors of higher knowledge scores. Despite pharmacists demonstrating satisfactory knowledge of fluoroquinolones, this study identifies key areas requiring improvement. Targeted interventions can address these gaps, further optimizing patient safety outcomes.

Keywords: antibiotics fluoroquinolones, boxed warnings, united states food and drug administration (FDA), safety, adverse effects, antibiotic stewardship

HCIC-32-2025

Fabrication and Characterization of Rice-Based Food Therapy for Management of Diarrhoea

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ABSTRACT

Diarrhoea is a global public health menace, particularly for children younger than five years and the elderly. It is associated with difficulties like high morbidity, death, high treatment costs, and psychological trauma for patients and caregivers. Conventional treatment of diarrhoeal includes electrolytic fluid recovery, consumption of lyophilized probiotics, lactobacillus and various medications. Fluid Replacement Therapy is recommended as adjunct therapy in all age groups. Rice based diet claims to be more efficient in controlling diarrhoea by reduction in durations and increases stool volume than the conventional ORS. The present study aims to fabricate food-based therapy comprising rice to combat high cost of diarrhoeal treatment which is a major issue in developing countries. Rice powder granules were prepared by two methods utilizing dry granulation and a semi-cooked technique for optimization of process validation. The granules were evaluated for flow properties through funnel, Hausner ratio, compressibility index and tapped density. Granules prepared through semi-cooking yields free flowing with angle of repose of 25.919º, bulk density 1.20 g/ml, compressibility index of 7.5 and Hausner's Ratio 1.08 over dry granulation process. Quality and effectiveness of fabricated rice granules were assessed by testing on 30 human patient volunteers. The treated group of patients were given rice granules while the standard control group was treated with oral rehydrating solution (ORS). Results revealed significant increase in stool volume and better medication time response with patients in treated group as that of standard group. Rice granules therapy has a potential to replace expensive medication used as a primary source to treat diarrhoea.

Keywords: diarrhoea treatment, rice-based therapy, fluid replacement, granule formulation, cost-effective therapy

HCIC-33-2025
The integration of Artificial Intelligence (AI) in healthcare

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ABSTRACT

The integration of Artificial Intelligence (AI) in healthcare has shown immense potential in transforming patient care, diagnostics, treatment planning, and administrative processes. However, this rapid adoption also raises concerns regarding ethics, privacy, and the integrity of AI systems. Ensuring that AI applications in healthcare adhere to ethical principles is critical to maintaining patient trust and safeguarding human rights. Key ethical considerations include data privacy, transparency, bias, accountability, and informed consent. Furthermore, healthcare AI systems must be designed to maintain fairness, reliability, and accountability to avoid discrimination and errors that could jeopardize patient outcomes. The implementation of robust governance frameworks, continuous monitoring, and regulatory oversight are necessary to uphold these ethical standards. This paper explores the intersection of AI, healthcare, and ethics, emphasizing the importance of establishing clear guidelines and policies to ensure the responsible development and deployment of AI technologies, while maintaining the integrity of healthcare systems. Ethical AI in healthcare is essential for achieving safe, equitable, and effective healthcare outcomes.

Keywords: integration, AI, ethical, safe, healthcare

HCIC-34-2025

Transforming Healthcare through Nutritional Innovations: A Focus on Obesity Prevention and Management

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ABSTRACT

A major global health issue, obesity is associated with a higher chance of developing chronic illnesses including diabetes, heart disease, and some types of cancer. It also places a heavy financial strain on healthcare systems. Beyond conventional weight-management techniques, creative and interdisciplinary approaches are needed to combat this epidemic. With an emphasis on how they can lower prevalence and enhance patient outcomes, this review examines the revolutionary potential of nutritional improvements in the prevention and treatment of obesity. Genetic, metabolic, and microbiome profiling-driven advances in personalized nutrition have opened the door for tailored dietary therapies, increasing their efficacy and adherence. Furthermore, research has shown that the gut microbiota may be a target for dietary modification and functional foods such as probiotics, prebiotics, and bioactive substances. This suggests that the gut microbiota plays a significant role in obesity. The usefulness of evidence-based methods for attaining long-term weight loss and metabolic enhancements is investigated, including intermittent fasting, low-calorie diets, and meal replacements. Additionally covered is the function of bariatric surgery, with a focus on the dietary effects and the necessity of specialized postoperative care to guarantee long-term success. Additionally, prevention techniques are discussed, emphasizing the value of public health campaigns, early-life nutritional interventions, and the incorporation of digital tools and platforms for real-time monitoring and education. The potential of emerging technologies, such as wearables, AI, and machine learning, to transform the treatment of obesity by offering individualized, data-driven treatments is investigated. Notwithstanding these developments, problems still exist, such as unequal access to medical care, financial constraints, and the intricate interactions between behavioural, environmental, and genetic factors that contribute to obesity. To create long-lasting, fair methods for managing and preventing obesity, this review highlights the necessity of interdisciplinary cooperation between researchers, medical professionals, and legislators. The medical community can lessen the impact of obesity, promote healthier lifestyles, and advance global health equity by adopting dietary innovations. According to the review's findings, dietary strategies are a key component of transforming healthcare and tackling the intricate problems associated with obesity when combined with precision medicine and developing technologies.

Keywords: obesity, intermittent fasting, low caloric diet, personalized nutrition, diet

HCIC-35-2025

Development and Optimization of Palatable Sodium Benzoate Formulation by Using Artificial Intelligence

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ABSTRACT

This study was performed to prepare microsphere formulation of sodium benzoate for pediatric population to mask the bitter taste of sodium benzoate using solvent evaporation technique. In pilot study many trials were performed to select the polymers which produced the microspheres with desired features. In range finding study, the lower and higher levels of the polymers, which worked well in pilot study were selected. Blend of Eudragit RS 100 and Carbopol 940 was selected based on the entrapment efficiency of microspheres. The ratio of the drug to polymer blend 2:1 (Eudragit RS 100, 250 mg + Carbopol 940, 200 mg) produced the microsphere with maximum encapsulation efficiency of 40%, percent loading of 0.64% and percent yield of 71.1%. In optimization study 11 formulations of Carbopol 940 were formulated using different polymer ratios. The data obtained was analyzed by applying ANN and DOE (Design of Experiment) to select the best levels of factor under study. Design matrix was obtained using Design of Experiment. Both ANN and DOE predicted the same results. Validation study confirmed the predicted formulation of CCD-QP approach. The E.E, yield, and drug loading of optimized formulation was found to be 26 %, 58%, and 0.353%, respectively. Dissolution study of optimized formulation was also carried out in acidic and buffer medium. The release of sodium benzoate was unexpectedly higher in the acidic media. The microsphere of sodium benzoate could be prepared for taste masking and there are possibilities of improving further the formulation by using either water in oil single or double emulsion with different surfactants.

Keywords: microspheres formulation, sodium benzoate, taste masking, solvent evaporation, pediatric population

HCIC-36-2025

Unit Dose Packaging an Approach to Address the Pharmaceutical Concerns of Oral Dry Powders

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ABSTRACT

Paediatric infections remain the most common health problem in the community. When a disease is caused by bacteria, the drug of choice are antibiotics. The suspensions are in dry powder form and need reconstitution by adding suitable solvent prior to administration to the patient. The adequate use of antibiotic suspensions involves proper method and solvent for reconstitution, using medicinal devices for administering the suspensions, maintaining accurate storage conditions for the suspensions after reconstitution. The study was performed to evaluate the appropriate use of antibiotic suspensions among the mothers, caretakers and nurses in Pakistan, to address the pharmaceutical concerns of dry powder antibiotic suspensions and to enhance the benefits of unit dose dispensing as an alternate to the multidose suspensions. The study was an observational cross sectional study, conducted at The Children's Hospital,Lahore and The Sheikh Zayed Hospital Lahore. Targeting the mothers, caretakers and nurses, pharmacists and physicians. The survey was conducted using four questionnaires containing questions regarding the reconstitution, storage, administration and disposal of antibiotic suspensions. The physicians and pharmacists were asked about their opinion about the advantages of unit dose dispensing. The sample size of the study was 391, including 130 mothers/caretakers, 77 nurses, 97 pharmacists, and 84 physicians. The results showed that the most commonly prescribed antibiotic suspension in these hospitals was Amoxicillin 25 (19.2%) and the common bacterial disease was tonsillitis 32 (24.6%). Only 52% mothers had the practice of reading the manufacturer's instructions. 78% of the participants used boiled cool tap water for reconstitution of suspension. 38% claimed that they add water in one step. Regarding the storage of suspensions only 50.2% mothers followed the correct practice of storing the suspension in the refrigerator. The rest of them followed the wrong storage practice. 36.9% of the participants used household spoon for administering the suspension, which was wrong practice. 85% of the participants don't have the knowledge about disposal guidelines. Most of the participants followed the wrong practice regarding use of antibiotic suspensions, A better way to cope with all these issues is either introduce unit dose dispensing in the form of tablet or sachets as an alternate or to improve the patient education by proper patient counselling regarding the safe and proper use of antibiotics at community level.

Keywords: paediatric infections, antibiotic suspensions, reconstitution practices, unit dose dispensing, patient education

HCIC-37-2025

Synthesis, Characterization and *in vitro* Cytotoxic Potential of Zinc Oxide Nanoparticles

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ABSTRACT

Zinc Oxide has been famously been used for its action against microbes and has been used in sun screens and ointments. But recent studies have shown its anti-tumor and anticancer effect and has been proposed as an efficient treatment for Hepatocellular carcinoma and other cancers as well. The improvement of medication pharmacokinetics is the key component of the current study's effective approach to the treatment of cancer. The effectiveness of zinc oxide nanoparticles as anticancer agents against HepG2 cancer cell lines is examined in the current study. Direct precipitation was used to synthesize zinc oxide nanoparticles. FTIR, SEM, and particle size analyzers were used to characterize the nanoparticles. About 370 nm was the average diameter of zinc oxide nanoparticles. The SEM study showed that the zinc oxide nanoparticles' surface was smooth. MTT assay demonstrated that ZnO-NPs may potentially be useful in treating hepatocellular carcinoma as evident by anti-cancer activity potential of ZnO-NPs against HepG2 cell lines.

Keywords: ZINC oxide nanoparticles, anti-cancer activity, hepatocellular carcinoma, HepG2 cell lines, nanoparticle synthesis

HCIC-38-2025

A Cross-Sectional Comparison of Prescription Errors in the Pediatric Population of Teaching and Non-Teaching Health Care Facilities of Punjab

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ABSTRACT

The purpose of this study was to investigate the types of prescription errors, to estimate the severity of prescription errors in primary, secondary, and tertiary care hospitals of Punjab. A ten-month cross-sectional study was conducted by collecting 1705 pediatric prescriptions from 11 public sector hospitals in five different districts of Punjab, Pakistan, using a convenient sampling strategy. Data were analyzed using SPSS (IBM, version 22) via descriptive analysis, Chi-square tests, and binary logistic regression. A total of 1705 pediatric prescriptions (1028 from teaching hospitals and 677 from nonteaching hospitals) were included during the study period. The most common missing parameters were weight (NTH: 78.1%, TH: 61.5%) and diagnosis (TH; 37.8%, NTH; 56.4%) in patient characteristics; doctor's name (NTH: 95.9%, TH: 75.1 %) and doctor's signature (NTH: 53.2%, TH: 46.8) in prescriber category. Dose errors were the most frequent errors (TH: 8.9%, NTH: 34.3%) in adolescent age group; followed by wrong drug and wrong frequency errors. Highest number of errors was reported in anti-infective class of drugs (10%) from adolescent age group (16.2%). Among top 10 medications, frequent errors were observed for the amoxicillin drug. The finding of this study shows that non-teaching hospitals had a greater rate of prescription errors than teaching hospitals. The chances of error can be reduced by implementing a pharmacist provision along with physician.

Keywords: prescription errors, pediatric prescriptions, public sector hospitals, pharmacist provision, Punjab

HCIC-39-2025

The efficacy of piper betel leaves extract on some bacterial strains by well diffusion method: an in vitro study

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ABSTRACT

Piper betel is perennial, shade loving plant, belongs to a family Piperaceae, and native to Bangladesh, Taiwan, Sri Lanka, India, and Pakistan.The present study was aimed to evaluate the antibacterial properties of Piper betel leaves against gram positive and negative strains of bacteria.Piper betel leaves were collected, shade dried, grounded, and extracted using Soxhlet apparatus in ethanol solvent. The antimicrobial activities of Piper betel leaves ethanolic extract (PBLE) were tested against the gram positive – *Staphylococcus aureus* and *Bacillus cereus* – and gram negative bacterial strains – *Pseudomonas aeruginosa and Escherichia coli* – observing the zone of inhibition by using agar well diffusion method.The PBLE showed zones of inhibition against all the tested strains of bacteria. Among all, PBLE at 100 mg had the most inhibitory effect on the growth of *Staphylococcus aureus,* with the zone of diameter 55±0.08mm, followed by *Pseudomonas aeruginosa* 48±1.02, *Escherichia coli* 35±1.02, and *Bacillus cereus* 25±0.18.-In this study PBLE showed a varying degree of inhibition to the growth of tested organism through well diffusion method. The results confirmed the presence of antibacterial activity of PBLE against various human pathogenic bacteria. The presence of phytochemical and antimicrobial activity is confirmed.

Keywords: Piper betel leaves, zone of inhibition, agar well diffusion method, Staphylococcus aureus, Escherichia coli.

HCIC-40-2025

Epidemic Consideration in Architectural Design of Healthcare Facilities: A Case for Hospitals and Healthcare Facilities in Pakistan

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ABSTRACT

Epidemics have been a great challenge across the timeline of humanity, requiring diverse stakeholders to integrate and devise strategies to manage them. Medical professionals and allied have always been on forefront using healthcare facilities and hospitals. One of the key stakeholders, Architects and designers of healthcare facilities, develop their designs based on set requirements and standards from medical professionals to optimize functionality and delivery of services. Recent pandemic of COVID19 raised questions related to epidemic preparedness, prevention and strategizing priorities in the design of hospitals. This research explored the design requirements based prioritization of public health with respect to epidemics in Pakistan through engagement of Architects and designers. Recent review of literature was based on exploration of research since 2010 focusing on healthcare facilities design, evolution and epidemic interventions.

Data collection questionnaire was based on World Health Organization guidelines for preparation of epidemics. Two way approach was used. Face to face interview based data collection was done from 36 architects in twin cities while online questionnaire was shared across multiple platforms with 74 respondents giving feedback. Analysis showed that only 20% of the architects have been engaged with design of healthcare facilities due to its technical high-tech requirements and even less than 10% have been engaged over the last 10 years. Majority were unaware about the concept of quarantine, isolation, infectious diseases, nosocomial diseases and allied protocols for epidemics, prior to COVID19. This raised the concerns that even design considerations have not been set forth by the people engaged in defining the design requirements for hospitals. It was concluded that due to lack of prioritization in design requirements for public health and epidemics, design requirements have been ignored at large and hence the designers have not been concerned as well. It is proposed that healthcare facilities & hospitals be revisited with respect to design considerations for epidemics and devise architectural design solutions as case studies for future epidemics to help manage burden of disease and mitigate the severe health risks through improved healthcare design.

Keywords: epidemics, hospital design, public health, COVID-19, architects

HCIC-41-2025
An Innovative Approach to Antimicrobial Packaging in Minimizing Foodborne Pathogens

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ABSTRACT

There is more than greater need for creative solutions to address new health risks and improve food safety as the global healthcare landscape changes. Antimicrobial packaging is one of the approaches, which is required for lowering foodborne diseases and protecting the general public health. Packaging techniques that actively stop microbial development while simultaneously maintaining food quality are becoming more and more important as worries about microbial contamination, especially grow in perishable foods. Food safety is being revolutionized by innovative antimicrobial packaging method that incorporate antimicrobial chemicals into packaging. By actively competing with bacteria, molds, and yeasts, these packaging technologies lower the risk of foodborne diseases. These methods provide an optimistic approach to food preservation by combining antimicrobial peptides, natural extracts, essential oils, and nanoparticles. To improve microbial inhibition and enhance the shelf life of food products, advanced packaging solutions also include active systems that allow to leave antimicrobial compounds into the food environment. These creative ideas have prolonged impacts that go beyond food safety. By enhancing the freshness of perishable goods, antimicrobial packaging promotes sustainability, reduces environmental effects, and food waste. Antimicrobial packaging supports the global movement for more environment friendly and health-conscious methods in the food business by reducing the need for preservatives and the frequency of foodborne diseases. Antimicrobial packaging is an innovative invention in the quickly evolving healthcare and food industries that not only guarantees food safety but also contributes to sustainability, the mitigation of foodborne illnesses and larger public health objectives.

Keywords: antimicrobial packaging, food safety, foodborne diseases, microbial contamination, packaging technology, sustainability, food preservation, public health, healthcare

HCIC-42-2025

Calcium and Iron-Based Gummies: An Innovative Solution for Addressing Nutritional Deficiencies in Children

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ABSTRACT

Calcium and iron-based gummies are an innovative solution to address the nutritional needs of children, particularly iron and calcium. These gummies offer a convenient and enjoyable way for children to meet their daily dose of these essential nutrients without the need for pills or syrups. Iron deficiency is a common issue in children, leading to fatigue, weakness, and impaired cognitive development. Encapsulated iron forms like ferrous bisglycinate or ferrous gluconate are used in gummies, making them easier to swallow and provide daily iron intake without bitterness or upset stomachs. Calcium is another essential mineral required for healthy bone development and dental health in children. Gummies can be used to meet calcium needs without relying on milk or other dairy products, making it easier for children to consistently consume the necessary amount of calcium every day.

Combining iron and calcium into a single gummy provides a comprehensive solution for addressing two common deficiencies in children. As the healthcare landscape shifts towards preventive and personalized care, calcium and iron gummies fit perfectly into the emerging trends of convenience, accessibility, and compliance. Digital health tools and personalized nutrition can help meet specific needs based on age, dietary restrictions, and health concerns. Gummies can also serve as an affordable, easily distributed supplement for children in remote or low-resource settings where access to healthcare or fortified foods may be limited. The future of calcium and iron-based gummies is bright, with ongoing innovations in nutrient delivery and bioavailability. Advances in encapsulation technology and flavor masking will make it possible to create more effective, bioavailable supplements without compromising on taste. As part of the larger movement toward preventive healthcare, these gummies are helping children lead healthier, more vibrant lives, paving the way for a future of improved well-being and health equity.

Keywords: calcium and iron-based gummies, nutritional needs, iron deficiency, cognitive development, bone development, preventive care, bioavailability

HCIC-43-2025

New insights in treatment strategies of non-alcoholic-steato-hepatitis (nash) to reduce fibrosis

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ABSTRACT

Non-alcoholic steatohepatitis (NASH), which is globally prevalent, induces inflammation, fibrosis, hepatomegaly, and steatosis in the liver. In the context of NASH, liver fibrosis remains the paramount prognostic indication. Reports on the efficacy of dietary treatments in reversing advanced fibrosis associated with NASH are inconsistent. The objective was to determine whether dietary intervention might restore the NASH induced in mice by a high-fat, high-cholesterol diet (HFHCD). Non-fibrotic NASH and fibrotic NASH were induced in C57BL6 mice by a high-fat high-carbohydrate diet for 5 and 12 weeks, respectively. A range of clinic-pathological assessments were conducted, encompassing plasma transaminase assays, liver histology, and fibrosis evaluation. The diagnosis of NASH histological findings was evaluated by administering a dietary intervention to affected mice for 4 weeks during early non-fibrotic NASH and for 4 and 12 weeks during late fibrotic NASH. HFHCD consumption induced oxidative stress, hepatomegaly, hepatic damage, and exacerbated steatosis in both early non-fibrotic and late fibrotic NASH.

The sole instance of significant fibrosis was observed in fibrotic NASH that remained after 12 weeks of a high-fat high-carbohydrate diet. Significant reductions in severe hepatomegaly, oxidative stress, inflammatory markers (TNF and CCL2 hepatic transcript expression), and steatosis were seen following nutritional intervention. In the late fibrotic NASH cohort, liver fibrosis shown only moderate reversibility after 12 weeks of SD, as confirmed by Sirius red and SHG/TPEF assays, which indicated a reduction in fibrillar collagen levels. Expression levels of both matrix metalloproteinases and tissue inhibitors of metalloproteinases dramatically decreased following dietary intervention in late fibrotic NASH; however, they remained elevated compared to the control group consuming standard chow. Ultimately, our findings indicate that NASH is optimally controlled by a combination of anti-TIMP therapy and dietary intervention, and that HFHCD consumption can induce liver fibrosis, which can only be somewhat ameliorated through dietary modification.

Keywords: Fibrosis, High fat, high cholesterol, NASH, Reversibility

HCIC-44-2025
Empowering Preventive Care: Beetroot as The Future of Nutritious Spreads

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ABSTRACT

The rapidly changing global healthcare landscape highlights the need for innovative dietary solutions to lower health risks and increase nutritional intake. In response, we created a beetroot-based dip to address common dietary concerns and misunderstandings. This dip is a nutritious and savory alternative to traditional chocolate spreads and snacks, particularly for youngsters who reject eating veggies. Beetroot, a nutrient-rich vegetable, has numerous health benefits, including improved cardiovascular health, respiratory and digestive system performance, and cognitive support. However, its natural bitterness and complicated texture have limited its general popularity. Our creative formulation overcomes these issues by neutralizing bitterness and harmonizing the flavor profile, making it ideal for everyone, including diabetics and diet-conscious people. The dip not only addresses daily nutritional needs but also has numerous health benefits, including increased blood flow, immunological support, and a lower risk of dementia. This product recreates how veggies can be introduced into diets by combining taste, nutrition, and attraction, especially for youngsters and individuals with certain dietary limitations. This beetroot dip highlights how preventive nutrition can help address lifestyle-related health concerns. It is aligned with the healthcare sector's preference for on innovative, affordable, and preventive nutritional treatments. By bridging the gap between taste and nutrition, the product promotes improved eating habits and general well-being, making it a game-changing addition to health-conscious food options. Our beetroot dip is more than simply a product; it represents a step toward modernizing food choices, improving health outcomes, and dealing with the difficulties of a rapidly changing healthcare landscape.

Keywords: beetroot, health benefits, dementia, cardiovascular health, immunological

HCIC-45-2025
A Tasty Twist in Tradition: The Nutritional Potential of Carrot Jam

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ABSTRACT

Carrot jam is a cutting-edge functional food that combines technology, tailored medicine, and nutrition to meet today's healthcare demands. Rich in vital elements such as beta-carotene, vitamins, and antioxidants, it helps to mitigate diseases linked to a lifestyle and reduce deficiencies. Carrot jam presents the possibility of customized formulations to fit unique health profiles in the age of genomics, enabling individualized treatment approaches. To create a product that supports preventative healthcare goals, this innovation also demonstrates interprofessional collaboration by bringing together food technologists, nutritionists, and healthcare professionals. Carrot jam production is improved using AI-powered analytics, guaranteeing safety, ethical transparency in manufacturing, and nutritional efficacy. From a sustainability standpoint, carrot jam reduces food waste while creating a high-value product by potentially using extra or cosmetically flawed carrots, which is in line with the circular economy principles. This strategy emphasizes how crucial environmentally and socially conscious business practices are in the food sector. Nutritionists make ensuring the product satisfies a range of dietary requirements, while food technologists improve the production process to keep best nutrient efficacy. This cooperative ecosystem works together to make carrot jam accessible and consumer-pleasing while also supporting preventative healthcare goals. Carrot jam serves as an example of how functional foods can be incorporated into diet regimens as healthcare moves toward more holistic approaches, targeting certain illnesses like diabetes, obesity, and immunological deficiencies while promoting overall wellness.

Keywords: carrot jam, antioxidant, functional food, beta-carotene, sustainability

HCIC-46-2025

Falsa Jam: A Nutritional Innovation for Sustainable Healthcare Solutions

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ABSTRACT

The Falsa fruit (*Grewia asiatica*), recognized for its sweet and tangy flavor, rich nutritional profile, and cooling effect, has seen a decline in practice due to its short harvest season, partial availability, and high perishability. In Pakistan, post-harvest dead of Falsa range from 20-35% of total production, on behalf of a significant trial in food preservation and diet security. To address these issues, we have developed Falsa jam, a sustainable innovation that reduces wastage, encompasses shelf life, and delivers the health benefits of Falsa in an appropriate form. Falsa is a nutritional powerhouse, rich in vitamin C, iron, calcium, and antioxidants that boost immunity, improve digestion, and promote skin health, making it a appreciated addition to the functional food category. By transforming Falsa into jam, we not only preserve its nutrients but also provide consumers with a year-round option to integrate this beneficial fruit into their diets. This tactic directly aligns with the evolving healthcare focus on preventive nutrition and functional foods. Falsa jam offers a modern, accessible way to re-join consumers with the health benefits of a traditional fruit, addressing public health needs while dropping food system inefficiencies. This innovation proves how food preservation techniques can contribute to improving healthcare outcomes and generating sustainable solutions in a changing healthcare landscape.

Keywords; falsa, antioxidants, jam, sustainable innovation, health benefits, vitamin c source

HCIC-47-2025
Carrot Cookies: A Nutrient-Dense Treat for the Vision Enhancement and Health

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ABSTRACT

New food solutions that promote improved health are much needed as diet-related health issues increase. Carrot cookies that are a nutritious snack, combines the ease of a prepared food with the nutritional advantages of carrots. The beta-carotene, fiber, and antioxidants found in carrots are believed to help with problems like eyesight weakness, inflammation, heart disease, and vitamin A deficiency. To give consumers a delicious and simple method to incorporate these nutrients into their diet carrot pulp, a by-product of juicing, is used and the recipe helps to reduce food waste and makes the cookies environmentally beneficial as well as nutrient-dense. The cookies are carefully prepared to strike a balance between flavor, texture, and nutritional retention. According to tests, carrot cookies are a better snack choice since they include more antioxidants, fiber, and vitamin A than the normal cookies. For those people, who do not often have access to fresh vegetables, carrot biscuits are a convenient and reasonably priced option to boost excellent vision and nutrition. They also back initiatives aimed at preventing illnesses by promoting better dietary practices. This product serves as an illustration of how front-line culinary concepts can solve healthcare issues and advance improved health in the modern world.

Keywords: carrots, nutritious, antioxidants, by-product, convenient, carrot pulp, reduce food wastage, innovative

HCIC-48-2025

Date Refresher-A Natural, Antioxidant-Rich Beverage for Enhanced Digestive Health

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ABSTRACT

Date Refresher is a healthy, non-fermented beverage prepared from rich in nutrients dates, that provides a naturally sweet, hydrating substitute for conventional sugary drinks. Dates, which are high in fiber, potassium, magnesium, and antioxidants, offer a host of health advantages that promote general wellbeing. Due to their high fiber content, dates boost the growth of good gut bacteria and encourage regular bowel movements, both of which are essential for a balanced microbiome. In order to maintain cardiovascular health, potassium and magnesium are vital. By keeping sodium levels in check, potassium helps control blood pressure, and magnesium is essential for healthy heart and muscle contractions. The Date Refresher is an excellent hydration or post-workout beverage since these days minerals also help maintain electrolyte balance flavonoids and carotenoids, two types of antioxidants found in dates, shield the body from oxidative stress and lower the risk of inflammation and long-term illnesses including cancer and heart disease. The beverage's health benefits are further enhanced by the optional addition of warming spices like cinnamon and ginger. These spices provide extra support for general health because of their anti-inflammatory, digestive, and metabolism-boosting properties. The Date Refresher is a healthier substitute for refined sugar-filled beverages since it offers a natural, long-lasting energy boost. It is the perfect beverage for anyone looking for better vitality, digestion, and overall wellness without the use of refined sugars or artificial additives because it hydrates the body, restores lost electrolytes, and improves digestive function.

Keywords: date refresher, healthy beverage, natural sweetener, hydration, gut health, cardiovascular health, non-fermented

HCIC-49-2025

Transforming healthcare in Pakistan: the role of architecture in building resilient and patient-centered facilities for future challenges based on pandemic learning

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ABSTRACT:

The healthcare sector of Pakistan faces significant challenges, including overcrowding, limited resources, and a growing demand for quality care. As the landscape of healthcare continues to evolve, there is a pressing need for innovative and end user centered solutions that enhance accessibility and efficiency. Architectural design plays a pivotal role in this transformation by creating patient-centered care environments that are not only functional but also conducive to healing. Recent trends in the post COVID-19 indicate a shift towards sustainable and smart hospital designs that integrate local contextual challenges with respect to issues associated with climate change and anticipated future diseases towards improvement in patient outcomes and operational efficiency. However the role of architecture is not clearly defined with respect to the current transformation and hence leads to a gap of multiuser integration and transformation where this rile can be defined and devised direction for future healthcare design at large. With rise in architectural firms adopting evidence-based design principles, the contextual challenges need to be explored in the local context and culture of hospitals. This research focuses on the documentation of the current role of architecture in the future healthcare transformation based on the recent pandemic learnings from multiple healthcare settings and how these could pave way towards synergy between innovative healthcare solutions and architectural design of healthcare facilities in Pakistan for future challenges and building resilience.

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